AMERICAN MACHINIST

A JOURNAL FOR MACHINISTS, ENGINEERS, FOUNDERS, BOILER MAKERS, PATTERN MAKERS AND BLACKSMITHS.

VOL. 5, No. 18. WEEKLY. | NEW YORK, MAY 6, 1882. | $3.00 per Annum. SINGLE COPIES, 6 CENTS.

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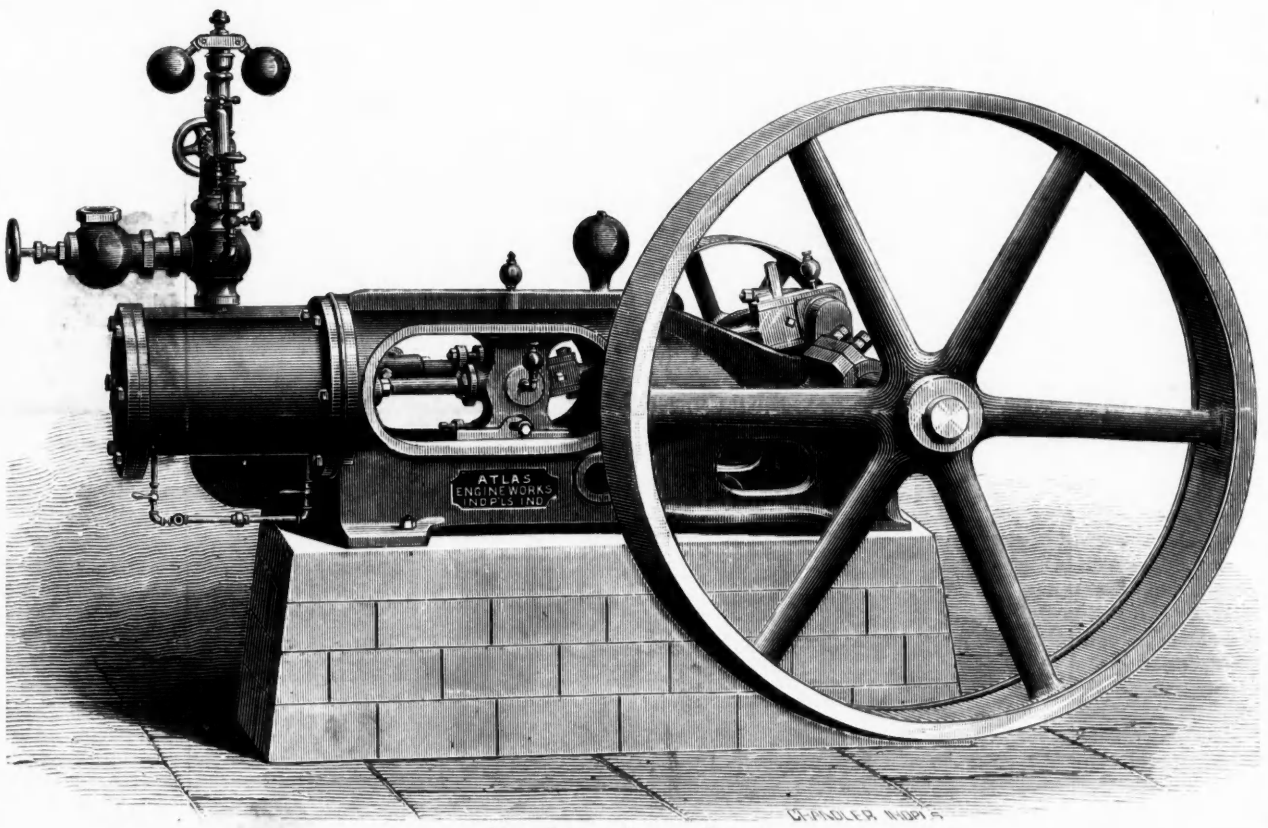
ENTERED AT POST OFFICE, NEW YORK, AS SECOND CLASS MATTER.

New Inside-Crank Slide-Valve Engine.

We present with this a perspective view, together with some of the more important details of a small-power horizontal inside-crank steam engine, recently perfected and brought out at the Atlas Engine Works, Indianapolis, Ind. This engine is designed for use in all kinds of light manufacturing establishments, where from 10 to 15 horse power is required, for driving electric lighting machinery, for use on plantations, in small flouring mills, and for any purpose where steady motion, good economy, and an absence of complication in the details is desirable.

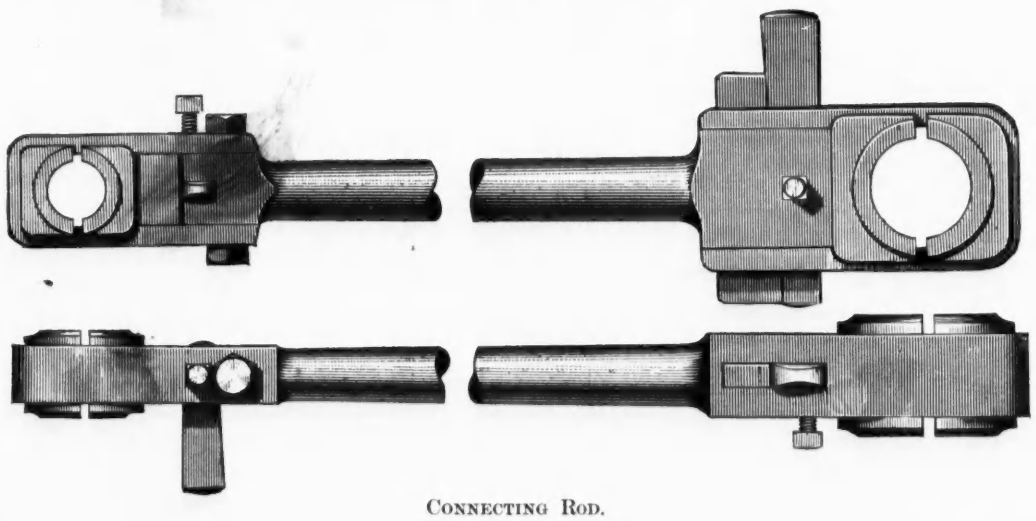


NEW INSIDE CRANK ENGINE

The bed is cast in one piece with the slides, main bearings, etc., which insures against the danger of getting out of line incident to the bolting of these parts to the bed. The slides are bored out to fit the circular section of the cross-head gibs.

The ports are large to provide for quick speed, and are made as short and direct as possible. The valve is of the kind known as the locomotive slide, driven by a plain eccentric motion, and arranged to cut off at five-eighths stroke.

The piston used, as shown in the cut (page 2) is without loose parts that are liable to derangement, and is fitted with packing, the construction of which is clearly indicated. The shoes shown at 3, page 2, which break the joints, are of brass, and are held against the packing, which in turn they "set" against the surface of the cylinder, by hard rolled German silver springs.



CONNECTING ROD.

The bottom shoe of the cross head is planed tapering, corresponding to the tapering on the cross head, and is adjusted for wear in a manner made plain by the cut.

The connecting rod is of forged iron, with gun metal boxes with large bearing surfaces.

The eccentric is provided with large wearing surface to adapt it to drive the valve and the pump which is shown bolted to the engine frame. The pump valves and cages are of gun metal, and the valve chambers are arranged to be removed for inspection, by taking off two nuts, without disturbing any other parts of the pump or engine.

In the cross section (page 2) is shown the arrangement of the heater in the engine bed casting. It is provided with a double coil of wrought iron pipe, so arranged as to admit of quick removal, should occasion require it.

The main shaft is of wrought iron, and is fitted with a heavy belt wheel on one side, and a lighter one on the other side.

These engines are adapted to be placed either on a regular foundation, or on a boiler, making the whole semi-portable.

Rust Joints.

It is questionable if a rust joint, that is a joint made with sal-ammoniac and cast iron borings, ever entirely ceases to eat away wrought iron with which it is in contact. It is not uncommon to see the sheet of a boiler, against which a rust joint has been for some time made, eaten away to about one-half its original thickness, and the propriety of making such a joint against the shell of a boiler under any circumstances, except it may be an absolute necessity and for a few days, is to say the least questionable. There are always ways to avoid the premeditated making of a rust joint, and even a poor substitute is to be preferred.

Extracts from Chordal's Letters.

SHAPES AND STYLES OF CHIMNEYS.—MISTAKES IN BUILDING CHIMNEYS.—HOW THE LADIES SET OUT TO IMPROVE A DIRTY CITY.—MR. SINTON'S PRIDE IN HIS SMOKE CONSUMER.

Mr. Editor:

* * * * You have published many useful drawings in the AMERICAN MACHINIST, but I very much question whether you have ever shown anything more needed than Mr. Towne's chimney, illustrated in a late issue. A chimney is of course nothing but an expensive hole for smoke to go through. The books are full of formulas for ascertaining the proper area and length of the hole, but are generally silent as to the methods of production.

* * * * In constructing the hole, safety and cost are the elements to be considered. A sheet-iron chimney, put together on the ground, lifted and guyed by rods, is, of course, a perfect chimney. It can be raised on any kind of soil; it costs a mere trifle compared a brick chimney; it can be lengthened if found too short; it can be moved in two days if wanted in a new position; and it is salable and available elsewhere if needed no longer. It is thus seen to possess some merits not found in brick chimneys. There are probably three hundred sheet-iron chimneys to one brick one in this country. I refer to furnace chimneys or smoke stacks, of course.

* * * * The main demerits of the sheet-iron chimneys are short life and the necessity of using guys. The necessity of frequent painting is no demerit as the paint money goes for interest in brick chimneys. The short life of sheet-iron chimneys is due to the quick inside corrosion through the thin metal, and the strength of the metal is not sufficient to permit a base hold to take the place of guys. The sheet-iron chimney is almost universally made round and straight. The only decorative features ever seen are in the way of top beads and paper collars. Some of this top work is so infernally "sheety" and ugly that it should send the designer to the penitentiary.

* * * * The brick chimney needs no guys, the immobility of a heavy mass being the dependence for stability. When a designer, who is governed by perfunctoriness, goes at a brick chimney, he reasons after this manner: I want area of hole with the least surrounding material, and of course a circle is the thing. I want the least aggregate vertical section of entire chimney, whereby the effect of wind pressure is reduced. Of course the circle is the thing. Thus a round chimney is determined upon. By a perfectly proper analysis of the strains our designer is led to construct the walls with a thickness decreasing towards the top; and, by a careful consideration of the relation of the volumes of gases to their temperatures, he arrives at the fact that the hole may be tapering towards the top.

* * * * This designer, holding to the rigid proprieties of things, will not entertain the idea of a shape more beautiful than the circular one, not even if the more beautiful one costs less.

But after all he will ornament the top of this ugly but perfectly proper chimney. The ornamentation may be a simple ring formed of projecting halves of bricks, or it may be a gorgeous capital taken from the ancients, but

it will be something ornamental. Our chimney designer is much like a certain class of machine tool designers who shape everything about the lathe with a view to its proper uses, strains, etc., and then concentrate their æstheticism in the legs of the lathe. I honor all these men for their inability to make a thing ugly all over.

* * * * The square chimney comes from a desire to cheapen a round hole by constructing it of common square bricks with common labor. The polygonal chimney with from six to a hundred flats is an approach to the circular form in the matter of economy of material; it approaches the square one in the simplicity of form of brick required, and in the grade of labor. They possess inherent qualities of beauty which do the heart good and don't interfere with the draft.

* * * * The fluted brick chimney, having sundry ribs and buttresses is designed in view of the fact that a tube is stronger, against flexion, if it is crimped or corrugated. Such chimneys have a capacity for beauty not found in the round or square shapes, but the top ornamentation must be carefully attended to or the eye becomes offended.

* * * * The Pennsylvania railroad, which has, by the way, furnished many good models of things and precious few poor ones, builds a standard chimney of brick. They have an elegant taper, a fluted or buttressed section, and a flaring top of the most dignified beauty. They have lots of these chimneys and all are alike.

* * * * A few miles from Philadelphia, near Germantown Junction, I think, some man has built a chimney patterned after the Pennsylvania railroad chimney, but may the Lord have mercy on him for the errors committed! Few men could ever see the top of this chimney and forget it.

I believe the courts have decided that the owner of real estate has title from the earth's center to the uttermost limits of space. This being true he can build such a cellar as he likes; he can build such a chimney as he likes; and he can put such a top on the chimney as he likes.

But I question his right to abuse the privilege by erecting in high heaven such a chimney top as the one spoken of. If it leaned towards Sawyer's the law would declare it unsafe and command its destruction or correction.

It does seem that the law could have some effect on a chimney leaning so far towards ugliness as to endanger the artistic morals of a neighborhood.

* * * * Tall chimneys require much care and judgment in the construction of their foundations. On more than one occasion such structures have been built on the solid rock and after years have shown that the rock while solid was not big enough to keep them from tipping.

* * * * Chimney straightening is a simple art requiring simply a cool judgment. The operation consists in taking a course of brick out of the long side of the chimney and substituting a thinner course, or in wedging up the short side and putting in a thicker course. The work at the Washington monument is one of the finest examples of chimney straightening on record.

* * * * A brick chimney one hundred and seventy-five feet high will swing from two to six feet at the top. The elasticity of the structure should be properly proportioned from bottom to top, else bottom strains may be imposed through too rigid a lever.

* * * * The man who builds a tall slim chimney alongside a big tall building and takes occasion to guy the top of his chimney to the building, generally makes a mistake The building and chimney not being tuned to the same pitch, or having different swings, will cause trouble. The chimney will become subject to short flexions below the guy. Much better to let the chimney swing as it wants to and distribute the swing from bottom to top.

* * * * There is another kind of chimney, better and more costly, than a sheet iron one, and as good and cheaper than a brick one, and—it is handsome or may be. I refer to a chimney made of plate iron, and stiff enough to hang by its bottom hold. These chimneys are made of plate iron varying in bottom thickness from a quarter to a half an inch, and the top iron is best about an eighth. A bottom plate with a nose on it is well belted to the foundation and the first course of iron starts from the nose. These chimneys are heavy to start on, and are lined with brick so that they possess certain of the stable features of brick chimneys due to their weight. As a mobile mass which will whip around in the wind it must have the elastic strength to whip itself back. Its base hold must be rigid.

* * * * I have written to an experienced builder of these chimneys, for drawing of one lately erected on the shore of a lake where the winds blow, and I can probably soon send you sketches showing all details.

* * * * There are two ways of erecting these plate iron chimneys. One is to start at the bottom course and rivet in place each successive course, using an inside scaffold only. the other plan is to start with the top course, jack it up and rivet the next course under it, and so on till finally the bottom course is put in place and riveted at top and bottom. Guys are used during the operation. This is the common method of erecting electric light towers or masts which are simply poles built of plate iron rings.

* * * * Once upon a time a dirty city built in a hollow got art upon its social and municipal brain. This city was and is an important manufacturing place and burnt and still burns green coal. Industry and soft coal and art when mixed and allowed to settle will generally precipitate the art. In the said city elegant cornices, with brackets and modillions and dentils of light colored material, danced in the delight of high light and shadow and beauty. But the dance stopped the second week after the cornices were up. Smoke blackened everything and bracket and modillion and soffit and spandrel and volute and abacus, all lost their projections and high lights and sank into the dead flat of sombreness.

* * * * The æsthetes protested and argued. The smoke makers claimed that the smoke made the living of the town and paid the decorative bills and simply soiled its own riches. Nothing could be done so long as argument lasted.

* * * * There is a sex which substitutes pleading for argument. The ladies organized a society for the prevention of smoke. They set to work right manfully, not to prevent the smoke they made themselves, but to plead with other smoke makers. They captured the town. They talked art and chemistry, chiaroscuro and carbonic oxide; Neapolitan sunsets and the smokeless chimneys of Liverpool. They worshiped at the shrine of the smoke-consuming God.

* * * * Mr. Sinton was one of the most wealthy, cultured, and foremost men of the town. He went over to the ladies' side and pledged his wealth and numberless beautiful buildings, and his business abilities to the cause of the prevention of smoke. He did more than talk about smoke prevention—he set to work to prevent the smoke from his own buildings. In short he invented a smoke consumer, and spared no trouble or expense in applying them and in getting good firemen to operate them.

* * * * At last the municipal government itself became inspired with an indefinable yearning after a something clean and smokeless.

The chimneys had become a bore, and the city powers decided to muzzle the entire smoke nuisance with an ordinance. Charged with this duty they vented their artistic feelings in an ordinance which made it a breach of the peace for any big chimney to smoke. Dire penalties attached to a violation of the law. A smoke inspector was appointed. All the inventors of smoke-consuming devices on earth, or in the waters under the earth, moved their headquarters to this utopian city. The ordinance did not say that all smoke should be consumed, but it said that all good citizens would have to put some sort of a machine at their furnaces looking toward that end.

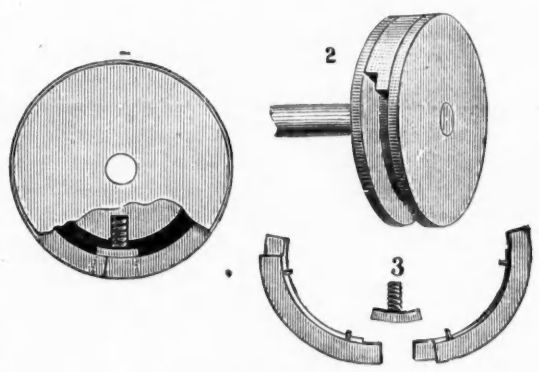
* * * * The music has just commenced. More than one of the brass knobs has already seen the inside of the police courts, and the smoke inspector has not yet got warmed up to his business. The line of action mapped out by this city is a novel one in this country, and will result in many good things if such results are possible, and when the battle gets a little warmer I will try and get you some valuable information on means and methods of burning soft coal without smoke.

* * * * Mr. Sinton is very proud of his device and has almost paralyzed his forefinger pointing, with pride, to the top of one of his chimneys.

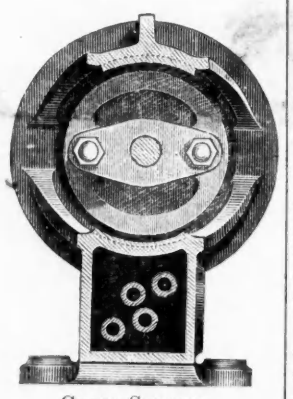
He got hold of one of the smoke makers and gave him a sidewalk view of the chimney tip and the two steadied their eyes and concentrated their gaze on the chimney, but the smoke could hardly be perceived. They went below decks to see how it worked, but there had been no fire built that day so the investigation had to be deferred.

* * * * Very Respectfully,

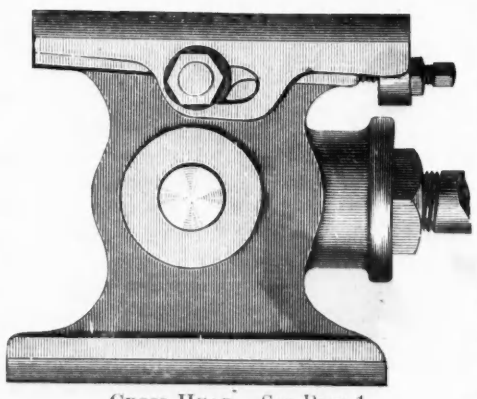
CHORDAL.



PISTON.



CROSS SECTION.



CROSS HEAD.—See Page 1.

The South is becoming an active and profitable field for manufacturing industries. Until within two or three years the South bought nearly all manufactured articles from the North, but now cotton mills, iron works, and special productive enterprises are springing up in every State south of the Potomac and the Ohio. Their influence, more than any political efforts, will tend to banish sectional prejudices, and bring prosperity to localities which have not heretofore been favored commercially.

Spring Meeting of the American Society of Mechanical Engineers.

The regular spring meeting of the American Society of Mechanical Engineers opened at the hall of the Franklin Institute, Philadelphia, Wednesday, April 19, and continued according to the previously published programme, day and evening, until Saturday. Among those present were the following:

President Robert H. Thurston, Hoboken, N. J.
President Andrew D. White, of Cornell University, Ithaca, N.Y.
Chief Engineer J. W. King, U. S. Navy.
Joseph J. Adams, New York City.
William S. Auchincloss, Philadelphia, Pa.
Stephen W. Baldwin, New York City.
William M. Barr, Cleveland, O.
Charles A. Bauer, Springfield, Ohio.
James C. Bayles, New York City.
Alfred Betts, Wilmington, Del.
C. H. Baker, New York.
C. P. McArthur, Philadelphia.
Thomas Hobson, Philadelphia.
George M. Bond, Hartford, Conn.
A. Hamilton Campbell, Elizabeth, N. J.
Thomas L. Churchill, Boston, Mass.
John W. Cloud, Altoona, Pa.
C. C. Collins, Erie, Pa.
Alfred B. Couch, 1509 Centennial avenue, Philadelphia, Pa.
William Cowles, P. O. Box, 887, Newburgh, N.Y.
Eckley B. Coxe, Drifton, Jeddo P. O., Luzerne Co., Pa.
R. H. Davies, Phœnixville, Pa.
Charles P. Deane, Holyoke, Mass.
John F. Allen, New York City.
John Fowler, Louisville, Ky.
A. K. Johnston, New York.
James E. Denton, Hoboken, N. J.
W. W. Drummond, Louisville, Ky.
Prof. Thomas Egleston, New York City.
Albert H. Emery, 38 Broadway, New York City.
A. Faber du Faur, 64 John st., New York City.
John Fritz, Bethlehem, Pa.
Robert Grimshaw, 212 South 8th street, Philadelphia, Pa.
H. S. Hayward, Jersey City, N. J.
F. F. Hemenway, 96 Fulton street, New York City.
Gustavus C. Henning, Baltimore, Md.
Theo. Bergner.
Julius S. Hornig.
J. C. Hoadley, Boston, Mass.
J. F. Holloway, Cleveland, Ohio.
Robert W. Hunt, Troy, N. Y.
Frederic R. Hutton, New York City.
Washington Jones, Philadelphia, Pa.
W. Barnet Le Van, Philadelphia, Pa.
W. S. Miller, New York.
Donald McLaren, Philadelphia.
Wm. J. Serrill, Darby, Pa.
Wm Metcalf, Pittsburgh, Pa.
Alexander Miller, New York City.
Charles H. Morgan, Worcester, Mass.
Joseph Morgan, Jr., Johnstown, Pa.
A. F. Nagle, Providence, R. I.
C. C. Newton, Philadelphia, Pa.
William E. Partridge, New York City.
Thomas R. Pickering, Portland, Conn.
Charles T. Porter, Philadelphia, Pa.
Francis A. Pratt, Hartford, Conn.
Thomas Whiteside Rae, New York City.
John Fernie, England.
John B. Root, New York.
Wm. Johnson, Lambertville, N. J.
R. H. Whitlock, Orange, N. J.
Charles B. Richards, Philadelphia, Pa.
Francis H. Richards, Springfield, Mass.
Prof. S. W. Robinson, Columbus, Ohio.
Horace See, Philadelphia, Pa.
Coleman Sellers, Philadelphia, Pa.
Oberlin Smith, Bridgeton, N. J.
Henry F. Snyder, Watsontown, Pa.
Allan Stirling, New York City.
George S. Strong, Philadelphia, Pa.
Ambrose Swasey, Cleveland, O.
Prof. John E. Sweet, Syracuse, N. Y.
Aug. W. Colwell, New York.
A. O. Kittredge, New York.
John J. Grant, Flushing, N. Y.
A. C. Christensen, Brooklyn, N. Y.
George N. Comly, Wilmington, Del.
Prof. Wm. D. Marks, Philadelphia.
E. V. D. Invilliers, Philadelphia.
J. B. Webb, Ithaca, N. Y.
Prof. Wm. P. Trowbridge, New York City.
W. E. Ward, Port Chester, N. Y.
William Oliver Webber, Lawrence, Mass.
George W. Weeks, Clinton, Mass.
W. H. Weightman, New York City.
Samuel T. Wellman, Cleveland, Ohio.
Joseph J. White, Philadelphia, Pa.
Moses G. Wilder, Philadelphia, Pa.
Wm. H. Wiley, New York City.
C. J. H. Woodbury, Boston, Mass.
W. F. Mattes, Scranton, Pa.
E. F. C. Davis, Pottsville, Pa.
V. H. Rood, Cleveland, O.
Horace B. Miller, New York City.
Lycurgus B. Moore, New York City.
Elwood Burdsall, Jr., Port Chester, N. Y.
Knight Neftel, New York City.
W. K Seaman, Scranton, Pa.
W. G. Cartwright, Stevens Institute, Hoboken, N. J.
C. H. Scribner, New York.
H. Webster, Jr., Stevens Institute, Hoboken, N. J.
Alfred Stern, New York.

Joseph Wetzler, Hoboken, N. J.
Charles W. Copeland, New York.
Wm. J. Root, Brooklyn, New York.
David W. Pond, Worcester, Mass.
Wm. A. Leavitt, Hartford, Conn.
Howard Murphy, Philadelphia.
Gram Curtis, New York.
E. F. C. Davis, Pottsville, Pa.
Wm. Hewitt, Trenton, N. J.
Samuel McElroy, Brooklyn, N. Y.
Geo. B. Mallory, New York.
Franklin Phillips, Newark, N. J.
George H. Phillips, Newark, N. J.
Wm Sellers, Philadelphia, Pa.
C. D. Wainwright, Boston, Mass.
Mr. Douglas, Philadelphia.
William Burnham, Philadelphia.
John W. Nystrom, Philadelphia.
Mr. Morgan, Alliance, O.
J. Sellers Bancroft. Philadelphia.
Jas. C. Brooks, Philadelphia.
Wm. Kent, Pittsburgh, Pa.
A. Wilkinson, Philadelphia.

The following additions were made to the Society by letter ballot:

MEMBERS.

Charles H. Loring, Chief Engineer U. S. N., Navy Yard, Brooklyn, N. Y.

Thomas F. Rowland, Continental Iron Works, Greenpoint, N. Y.

W. R. Eckart, P. O. Box 1587, San Francisco, Cal.

John B. Root, Abendroth & Root Manufacturing Co., Greenpoint, N. Y.

William T. Leman, 305 West 55th Street, New York City.

Walter E. Parker, Lawrence, Mass.

Maunsel White, Bethlehem, Pa.

William Johnson, Superintendent Lambertville Iron Works, Lambertville, N. J.

David W. Payne, B. W. Payne & Son, Corning, N. Y.

H. C. White, Hartford Engineering Co., Hartford, Conn.

Julius L. Horgin, Jersey City, N. J.

John M. Hartman, Taws & Hartman, 1237 N. Front Street, Philadelphia, Pa.

T. W. Hugo, Duluth, Minn.

J. H. Bennet, 80-82 Reade Street, New York City.

J. S. Lane, Webster, Camp & Lane Machine Co., Akron, Ohio.

Albert M. Stahl, Engineer Corps, U. S. N., Navy Department, Washington, D. C.

A. E. Leavitt, Hartford, Conn.

F. H. Underwood, Tolland, Conn.

JUNIORS.

Isaac Chase Greene, P.O. Box 846, New York City.

W. Irving Babcock, Delaware River Iron Shipbuilding and Engine Works, Chester, Pa.

Andrew J. Caldwell, Hydraulic Works, Van Brunt and Rapelye Streets, Brooklyn, N. Y.

Lienau Walden, 430 Walnut Street, Philadelphia, Pa.

In accordance with a resolution of the Council, the following deceased members were elected "Honorary Members *in Perpetuam*," as founders of the society: Henry Rossiter Worthington, Alexander Lyman Holley.

The full list of papers presented is as follows:

"Results of a Test of Upright Boilers and Pumping Engines."—J. S. Coon.

"The Chronograph for Engineering Purposes with the Hipp Escapement."—W. R. Eckart.

"On the several Efficiencies of the Steam Engine." Robert H. Thurston.

"The Thermodynamics of certain Worthington and other Compound Pumping Engines."—S. W. Robinson.

"Determination of Heating Surface of Ventilating Flues."—Wm. P. Trowbridge.

"Note on the Economy of the Windmill as a Prime Mover."—Alfred R. Wolff.

"Screw Propulsion."—John B. Root.

"A Standard Gauge System."—Geo. W. Bond.

"Description of the Edison Steam Dynamos in the New York Central Station."—Thomas A. Edison, Ph. D., and Charles T. Porter.

"On Rankine's theories relative to the Economy of Steam in the Cornish Engine."—Wm. P. Trowbridge.

"A Comparison of Turbines."—Samuel Webber.

"Steam and Air Economy."—Samuel McElroy.

"Steel Ships and Modifications of Models to meet Requirements of the Ocean Carrying Trade."—Henry W. Gorringe.

"Experiments on the Specific Heat of Platinum."—John C. Hoadley.

"Positions of Views Upon Mechanical Drawings."—Oberlin Smith.

"Belts Connecting Pulleys in Non-Parallel Shafts."—Prof. J B. Webb.

"Note on the Action of a Sample of Mineral Wool Used as a Non-Conductor Around Steam Pipes."—Prof. Fred. Hutton.

"Built-up Work in Engine Construction."—Horace See.

"Efficiency of the Steam Boiler."—R. H. Thurston.

"A Spring Fan for Poppet-Valve Drawings."—Gracio Curtis.

"Deflection of Shafting."—Henry R. Towne.

"Influence of the Franklin Institute."—Frederick Fraley.

"Corrosion of Propellor Shaft of Steamship City of New York."—Charles Sperry.

"The Fly Wheel."—Wm. Johnson.

At the Holley memorial session, on Wednesday afternoon, a large attendance and manifestations of deep feeling testified to the universal sorrow.

The following resolutions were presented by Prof. W. P. Trowbridge, and unanimously adopted:

Whereas, We are called upon as a society to give expression to profound and sincere sorrow in the death of our Vice-President and friend, Alexander L. Holley:

Resolved, That we mourn the death of our friend as an irreparable loss to the profession, and as a sad personal bereavement.

Resolved, That in the death of Alexander L. Holley the country has lost an engineer whose genius and industry have greatly aided our industrial development, and to whom all branches of the engineering profession were profoundly indebted.

Resolved, That we shall ever hold Alexander L. Holley in cherished remembrance as one whose life and example are an inspiration to high views and worthy motives, and who gave a new dignity to all branches of our profession, and that we remember our association with him as something which made our lives happier and our work lighter.

Resolved, That the Secretary be directed to forward a copy of these resolutions, with the report of our memorial services, to the family of Mr. Holley, with assurances of the deep and tender sympathy we feel for them in their bereavement, and that the committee of five appointed by our council be directed to co-operate with the committees appointed by other societies in furthering the work of securing a worthy and permanent Holley Memorial, in whatever form may be deemed most appropriate and best calculated to keep his work and example before the rising generation of engineers.

After the reading of the resolutions, President Thurston read a memorial paper relating to the death of the lamented Henry R. Worthington, which was prepared some months ago by Holley, and commented upon the fact that so many of the glowing tributes contained in it would now be equally applicable to the present occasion. President Thurston proceeded to deliver a touching preliminary address a brief abstract of which we print below. After expressing regret that modesty prevented Holley's acceptance of the first presidency of the society, and alluding to the warm friendship which had existed for twenty-five years between Holley and himself, he outlined the importance of the services rendered by Holley in the organization of the society, and referred to the intense interest felt by him, not only in the society's welfare, but also in every plan looking to the establishment of a rational system of education, and a general system of promotion of the useful arts and applied sciences by the united efforts of statesmen, men of science and men of business. Paying a glowing tribute to the union in Holley of mental and physical strength, with a rare and sterling judgment, and an intuitive appreciation of and love for the right, he accounted for the eminent position reached by him as being due to the combination of so many admirable qualities with the highest engineering skill. Alluding to the contemplated erection of a suitable monument, he expressed a hope that another and greater monument would eventually be erected in the establishment of a "Holley Memorial School of the Arts and Sciences of Engineering," which should be comprehensive enough to be worthy of its name.

JAMES C. BAYLES, the eulogist chosen for the occasion, then delivered an address, portions of which are as follows:

* * * * *

We realize now as never before that in his high sphere of special usefulness, Holley was one of the greatest engineers of his time, and that a generation hence the student of science, who scans the metallurgical and engineering literature of this century, will see better than we do now the impress of his name on the corner stones of more than one of the great industries of the future.

* * * * *

Luck and chance were not factors in the equation of his success. What he did he first knew; what he knew he first learned. There was no happy accident to mark the turning point in his professional career. His inventions and improvements were but the means by which he sought the attainment of ends kept steadily in view. Thoroughness characterized his habits of thought and of work, and those who knew him best, best knew how carefully he prepared himself for whatever he had to do. In this, probably more than in anything else, we find the secret of his uniform success in all the undertakings and duties of his brilliant career.

* * * * *

He went direct from the school into the large locomotive works at Providence, and for about a year ran a locomotive on the Stonington road. Years after, as President of the American Institute of Mining Engineers, we catch a suggestion of his fruitful experience in this modest capacity, in the striking passage in his addressess on "The Inadequate Union of Engineering Science and Art," in which he thus describes the relation of the driver to his engine: "The thoughtful locomotive driver is clothed upon, not with the mere machinery of a larger organism, but with all the attributes except volition of a power superior to his own. Every faculty is stimulated, and every sense exalted. An unusual sound amid the roaring exhaust and the clattering wheels, tells him instantly the place and degree of danger as would a pain in his own flesh. The consciousness of a certain jarring on the foot plate, a chattering of a steam valve, a halt in the exhaust, a peculiar smell of burning, a sudden pounding of the piston, an ominous wheeze of the blast, a hissing of a water gauge, warning him respectively of a broken spring hanger; a cutting valve, a slipped eccentric, a hot journal, the priming of the boiler, high water, low water, or failing steam; these sensations, as it were, of his outer body, become so intermingled with the sensations of his inner body, that this wheeled and fire-feeding man feels rather than perceives the varying stresses upon his mighty organism."

* * * * *

At the outset of his professional career Holley began to write for publication. With an unselfish love of truth, he could not conceal or save for his own benefit the fruits of his study and experience. At twenty-three we find him a regular contributor to the technical press, especially to Colburn's *Railway Advocate*.

* * * * *

At twenty-four we find him proprietor and editor of the *Railway Advocate*, which, founded too early and without an appreciative constituency, suspended during the crisis of 1857. This release from serious and unprofitable responsibilities gave Holley a chance to go abroad for study. At twenty-six we find him publishing with Colburn, as their joint production, a work on European Railways, which had an immediate and important influence on American railroad construction and operation. At the age of twenty-nine we find him again started in what gave promise of a brilliant journalistic career. He went abroad as correspondent of the New York *Times*, and the scrapbook in which he preserved his writings is, I am told by Dr. Raymond, who now has them for examination, a mine of wealth from which might be compiled a brilliant and memorable volume. Of the value of his work as a contributor to the newspaper press we can have but little knowledge. That it was potent in stimulating invention and improvement we may be sure. Such work is often valued too lightly. It seems to possess but a transient interest, and to be pushed aside, almost before the ink is dry, by the fresh attractions of the next day's current literature; but every valuable article finds somewhere readers to whom it is worth more than a library of books. The writer for the newspaper press may often feel discouraged by the thought that what costs him so much is so soon forgotten, but every article which is worth remembering is remembered.

* * * * *

Holley's connection with the Society of Mechanical Engineers is a memory of which we may well be proud. Perhaps to him more than to any other member its success is due. His active interest in the project was in itself an assurance that it would realize the objects of its organization, and his name created confidence in all departments of the profession.

* * * * *

Having brought the Bessemer practice up to the high perfection which it had attained in the working of the so-called acid process, he recognized the impracticability of restricting a steel plant in the United States to the comparatively small production which satisfied English engineers and capitalists. When Thomas was in this country he and Holley were at Troy together. Thomas was greatly interested in all he saw, and while in the converter house he remarked that he "should like nothing better than to sit down on an ingot mould and watch the work all day." "If you want to find an ingot mould cool enough to sit on," replied Holley, "you will have to send to England for it." Holley's improvements had rendered impossible the delays which would have resulted from the frequent relining of converters, and to perfect the basic process he had hit upon the clever expedient of making the linings detachable, so that with very little delay a new lining could be substituted for one burned out, and the work go on, enabling our steelmakers to adopt the basic process, when it is to their interest to do so, without sacrifice of product. This was the crowning work of Holley's life, and to us he gave the paper which would have been welcomed by the greatest technical societies of the world.

It is much to be regretted that petty jealousies led to the decision to withhold from Holley the Bessemer medal, which he, more than any engineer, had earned; but he was too great a man to be made unhappy by the fact that he had excited in weaker minds feelings which found no place in his own great, loving heart. The consciousness that he merited the honor was worth more to him than to have had it grudgingly bestowed by those who knew, but dare not confess, that he towered high above those who sat in judgment on his claims to recognition. The love of his friends was always worth more to Holley than barren compliment, and he died without uttering a word to indicate that he had known a disappointment in life.

* * * * *

We present herewith *extracts* from the remarks made by the various speakers:

JOHN FERNIE, of England: Although I was not an intimate friend, I met Holley in this city in 1876, and bear my testimony, as an English engineer, of the appreciation we had in our country of his mechanical skill and genius. We looked up to him as an authority and as your representative, and recognized him as a writer and inventor holding a front rank among English and American engineers, and treated him accordingly.

ECKLEY B. COXE: I have been present at many meetings both of the Civil and Mechanical Engineers' Societies, at which our dear friend Holley was present. This is the first meeting of either society that I have attended since he has gone, and, as I look around and see the many who have been with us while Holley was here, and see him missing, I feel as if I could say nothing. Holley was a man whom to have known was a privilege. He made us better; he made us stronger; he made us act like men and feel like men, and I do not believe there is a man who lives who has had the honor and the privilege of being acquainted with Alexander L. Holley who has not found himself a better man for being so. Of him we may well say, "It is better to have loved and lost than never to have loved at all." I cannot speak of his great genuis, as that is not necessary. He wrote his name as an engineer where none can efface it; but as a friend, as a man—as a man who made engineering a profession—I think Alexander L. Holley has done more for the profession than any other man who has lived on this side of the Atlantic. I can only say that this is the saddest meeting I have ever attended. Gentlemen, let us all try to live as Holley lived, and to obtain a name like his. He did everything to advance and glorify engineering, and never anything to cast any cloud upon his fair fame.

ROBERT W. HUNT: In speaking of Holley, I can hardly trust myself to speak. Yesterday I happened to be in the shops of the Corliss Steam Engine Company, and mentioned to one of the workmen there that today I expected to attend the memorial meeting of the Mechanical Engineers on the death of Alexander L. Holley. The man exclaimed, "What! our Holley?" And so it

(*Continued on page* 7.)

The Korting Jet Condenser.

Primarily, the use of a condenser as applied to a steam engine is to economize in the use of steam, by removing the pressure of the atmosphere—about 15 pounds to the square inch—from the resisting side of the piston. The removing of the pressure from this side being substantially the same in effect as the adding of pressure to the other side of the piston, and being ordinarily a large per cent. of the total pressure required, a corresponding saving in the fuel necessary to generate steam is effected.

In the construction of a condensing engine the appreciation of the addition to the mean effective pressure by removing the resisting pressure, assists in determining the proper cylinder proportion for the work to be done. But in the addition of a condenser to a non-condensing engine the saving that should result may be considered in different ways: as in adding to the power possible to be developed by the engine at the highest practicable boiler pressure, the result being fuel economy and perhaps the doing away with the necessity for buying a larger engine; or looked at another way, while the engine may be large enough to do the work at a late cut-off, the increase of the available pressure due to the use of the condenser will permit an earlier cut-off and a consequent saving in steam. Again the cut-off may be at the most economical point with a given boiler pressure, in which case the application of the condenser will permit a reduction of the boiler pressure, and hence a diminished consumption of steam, and perhaps greater safety.

In whichever of these directions economy is looked for, of course it is due to the fact that the use of the condenser, in effect, adds a large part of the atmospheric pressure to the mean effective pressure required to move the piston against the resistance of the load on the engine, thereby permitting the load to be increased to that extent, or less steam drawn from the boiler to do the same work.

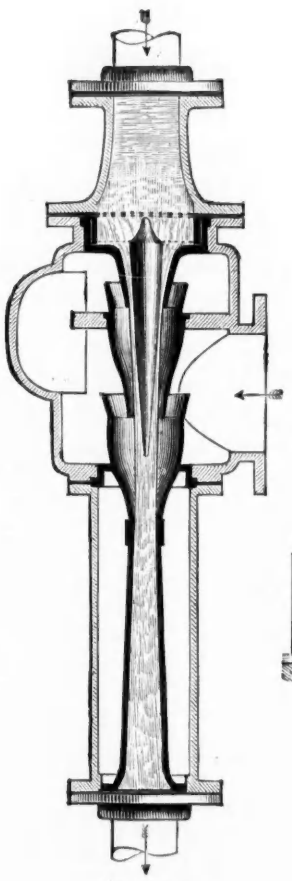
The devices in use for this purpose are the air pump, either driven from the engine or independently, and some form of a condenser in which a rapidly moving column of water is made to serve the purpose of the air pump.

One of these latter devices, the "Korting" jet condenser, was illustrated in the AMERICAN MACHINIST of July 24, 1880. At that time, however, we were unable to present more than an outside view of the instrument. Since the time referred to improvements have been made in the construction and arrangement, which permit its use with a different relative situation of its appliances. As shown in our previous illustration it was necessary to place the water supply tank 15 feet above the condenser. While in some instances this was not objectionable, in others it compelled the use of a pump to raise the water to the tank, which would have flowed to it if it had been practicable to have placed it lower.

By referring to the present illustration, which represents the condenser, as applied to a steam engine, as well as a sectional elevation of it, it will be seen that the water tank is placed on a level with the cylinder, the only limit to the position it may occupy being that the vertical distance between the water level in the tank and the discharge water level (which may be at any distance below the cylinder) shall be 15 feet, this height being ample for any degree of vacuum.

In the engraving, *C* is the strainer used in connection with the bell-shaped connection with the water pipe, and *D* is the valve by which the water supply is regulated. The smaller of the two pipes below the engine foundation is the discharge from the condenser, and the larger is the free exhaust. *A* is a combined check and stop valve, and *B* is the free exhaust valve. With the condenser in operation, the valve *A* is open, so far as its operation as a stop valve is concerned, while *B* is closed.

From the small engraving it will be seen that the valve *A* is provided with a hinged seat, which is not attached to the stem, the stem simply holding the valve to its seat, in the one instance, or permitting it to be opened by a slight pressure, in the other. Its use in connection with this, or with any form of condenser, is to prevent the possibility of the flow of water from the condenser to the cylinder, which is liable to occur with disastrous results should the pressure from any cause become momentarily less in the latter than in the former. This it does by operating as a check valve, completely shutting off the back flow of water till the danger is passed.



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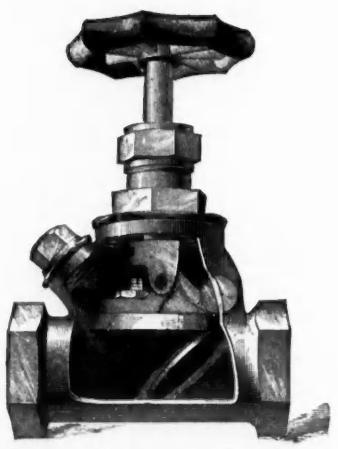
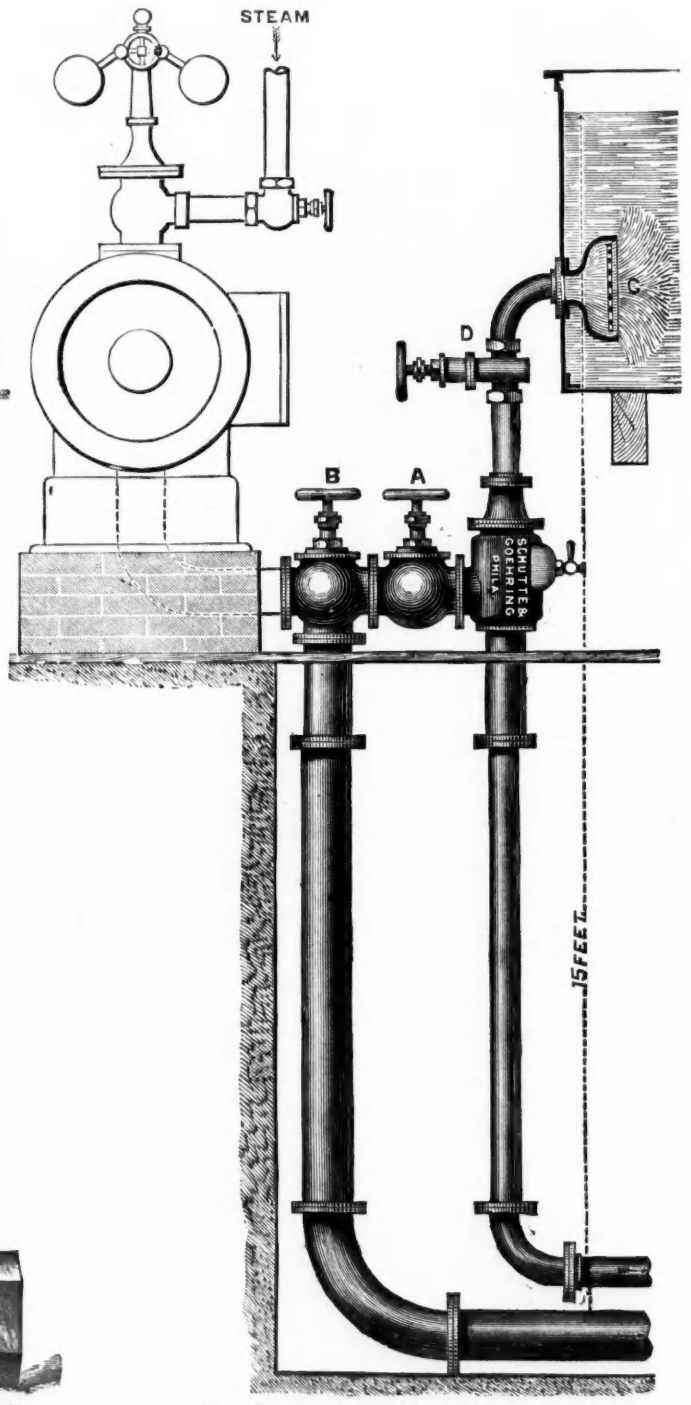


COMBINED CHECK AND STOP VALVE.



THE KORTING JET CONDENSER.

If at any time it is necessary or advisable to use the free exhaust, the valve *B* is opened, and the valve *A* is closed.

From the sectional engraving it will be seen that the condenser consists of a strong cast-iron case enclosing a double jet and nozzle of composition. The water for condensation enters at the top, and passing downward is spread out into a section corresponding to an annulus, by the interposition of the taper spindle. After passing the nozzles it is contracted to a solid jet completely filling the neck of the tube. The exhaust steam enters the condensing chamber surrounding the nozzles, into the intermediate one of which it is drawn by induction, where it meets the water and is condensed. Any uncondensed vapor or air that may find its way into the chamber, and which does not pass out through this nozzle rises and is drawn into the upper nozzle, the operation being to maintain a vacuum in this chamber the same as is maintained in the condenser by the operation of an air pump.

The spreading out of the water into a thin ring or annulus presents a large surface with which the steam comes in contact and is condensed, and at the same time maintains the high velocity necessary for induction.

One of these condensers may be readily applied to any engine, large or small, without reference to the speed or steam pressure, requiring no foundation or special preparation, and occupying but little room. The only requirement is a sufficient supply of water at a height of 15 feet above the lowest practical level at which the discharge may be fixed. There are no moving parts to require attention or to consume power in their operation, and hence the total effective power due to the vacuum is applied to useful purposes.

They may also be applied with equal effect to pumps, oil stills, vacuum pans, and to other purposes where it is required to form a vacuum.

They are made by Schutte & Goering, Philadelphia, Pa., or are sold by A. Aller, 109 Liberty st., New York.

In hardening small steel tools, or any article of steel that is thin or light and heats quickly, it is advisable to remove on a grindstone or emery wheel the scale formed in forging before heating. The scale being of unequal density, if it is not removed it is generally impossible to heat evenly, besides the degree of heat can be better observed if it is removed.

Speculations as to the Steam Engine of the Future.

BY N. H. BROWN.

II.

In a former number an examination was made of certain details of the engine as to the probability of their survival, which may be continued by further inquiry as to valves, their motions and location.

The rapid motion of admission valves is hardly to be desired; for the piston, with its short reciprocations, cannot be regarded as a projectile with a long flight, to be hurled by the shock of impact.

Steam can probably better impart useful and continuous motion to the engine by pressure than by momentum, which might affect the integrity of the engine by concussion, and that of the boiler by pulsation.

It is known that a volume of steam cannot be abruptly disturbed with impunity when the inclosing parts are in a state of high tension, and the rapid motion of a large admission valve might do this. If the steam gauge upon the boiler becomes considerably excited upon each stroke of the piston, we may conclude that the admission is too abrupt, and that the boiler is oppressed by uncalled-for strains.

In the other extreme, there can be such a tardy motion of the valve as to produce "wire drawing," which will detract from the force of the steam current; but with ports of ample size this need not be feared.

As for valves of release, it will be seen that the steam in the cylinder at the completion of the stroke has, so far as direct power is concerned, performed its full measure of useful work, and its immediate discharge and departure is desired, for otherwise it will exert its remaining force to resist the return of the piston.

Hence, these valves may have a very rapid motion without detriment to any principle.

The plain slide valve holds its office by an uncertain tenure. In its favor, aside from its merits, are its long and useful service, extensive application, and the fact that engineers do not agree upon a substitute.

Regarded as a mere block of metal, moving on a plane surface, in straight lines and with a short travel, it embodies the idea of simplicity. Considered as directing all the motions of the engine, it may be its most complicated factor.

Against it are the disadvantages that usually follow when separate duties are combined, and its excessive pressure upon its seat.

The suspicions that this valve involved an extravagance of power for actuation were confirmed when it was put upon its trial by scientific inquiry.

Back pressure that has been depended upon to reduce the resistance of the valve will, in a correct system of engineering, nearly disappear. It is on account of this excessive pressure that the valve is short and the passages long and tortuous, that it requires such power for actuation, and is not amenable to the control of regulation.

This pressure seems to inhere to the valve in this form, as all known methods of relief either transform or divide it.

As this valve and its operation is a combination of parts and duties, its division is merely a return to first principles; and, as the inclination of engineering is in this direction, we may inquire as to how much has been done.

We already find in use upon some engines two slide valves, one of which (assigned to the duties both of admission and release) is large, and fitted with elaborate appliances for its relief, and in or upon this a small cut-off valve, which opens or closes a port of exactly the same area as does the larger

valve, and this without complaint, and without the least provision for its relief.

Now, as the little cut-off valve can regulate the admission, we may suppose that it could direct it entirely without any assistance from its principal; and, by assigning its duplicate to the duty of release, we shall have completed the system, and the question of balancing valves by appliances may be relegated.

All slide valves possess one quality that for the purpose is valuable to the last degree—that of maintaining their steam-tight adjustment to their seats. It is well known to the mechanic that the motion of one surface upon another in straight lines will cause them both to assume the form of a plane, and that further motion will maintain such form. The slide valve has this motion and form, and may preserve the desired adjustment until the material is destroyed.

On the other hand, abrasion will impair the adjustment of valves of other forms and motions, as, where a convex valve vibrates in a concave seat, abrasion will destroy the similarity of the lines of contour by reducing the valve and enlarging the seat.

As to the location of valves, science would indicate that a release valve at the bottom of the cylinder would discharge the water of condensation by gravity, and that the induction might be at the top, as the point furthest removed from the lower temperature of the release port. In this connection, we may remark that a certain amount of compression seems desirable to cushion the return stroke, to fill the clearance, and to maintain the temperature of the metal abutting upon the clearance. This question of location of valves is usually considered in connection with that of convenience of attachment, and a compromise effected by which they are located at the side, which is not very objectionable, and which certainly admits of direct connections.

As the arms of the transverse rock shafts of oscillating valves lead to a central point, or at least to a central line in the plane of the main shaft, their connections may be reasonably direct.

The objection to a slide valve upon the top of the cylinder—that its rock shaft and connecting rod above the piston rod and cross head is unsightly—is well taken; but an arrangement can probably be devised that will entirely obviate this, be satisfactory in all other respects, and apply also to valves at the bottom. Where release valves have been alluded to specially as such, it is understood that they were to be located at the bottom, and to be subject only to the pressure of the steam in the cylinder upon them, which arrangement is practicable even for a slide valve, and will add but little to the clearance. We may here explain that the clearance to be avoided is that of a long admission passage, which enfeebles the induction current by friction and by condensation, especially if the exhaust has just passed through it.

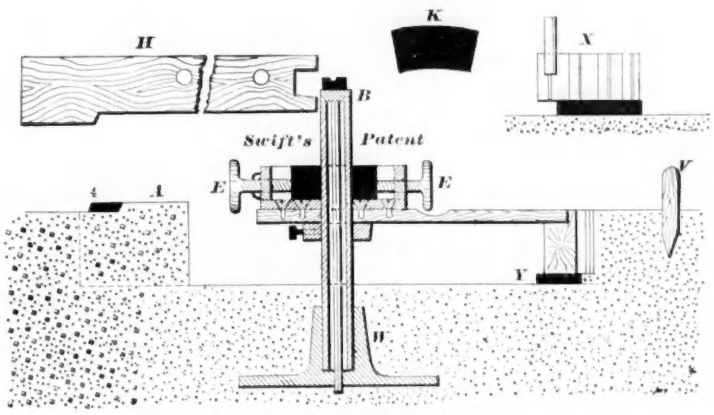
The eccentric is well intrenched as the principal agent of actuation, although some attempts to supersede it have been reasonably satisfactory.

It is not well adapted for the actuation of individual valves, for these, in each case, need only a motion which is completed during the stroke which they direct, while the eccentric extends its motion over the entire revolution. This involves a travel of the valve, one-half of which is a surplusage and worse, for during the excess of travel the valve is handicapped by an increased pressure.

This is a confession of poverty of invention or mechanical possibility; and, if we retain the eccentric for its valuable qualities, we may unite the valves for admission by the valve rod, assign one eccentric for their actuation, and provide a similar arrangement for the valves of release. With this arrangement, even, the admission can be controlled by regulation, which may well be located upon the eccentric.

Centrifugal force will readily give to the eccentric such motions on the shaft as will preserve the lead of admission, and control it as to cut off from a large fraction of the stroke to bare admission, which will enlarge the economical scope of the engine for variable loads.

In closing this review of valves, we may remark that the fathers of the engine, when they adapted the slide valve, "wrought better than they knew," and that possibly we may better seek for the desired valve in the direction of a scientific application of first principles than in that of radical departure; for—(to quote from the paper of Mr. Hague in a late number)—"if we attempt to balance the valves, we are liable to produce the apparent economy of obtaining very excellent steam expansion within the cylinder, and allowing the cream of the profit to escape by way of that back door, generally called the balance plate."



DEVICE FOR MOULDING GEAR WHEELS, &c.

Improvement in Moulding Gear Wheels, Pulleys, Etc.

Probably in no branch of the iron business has so little been done to assist, by mechanical appliances, the skill of the workman as in that of moulding. In the main, the moulder goes about his work to-day substantially as he did thirty years ago, his success depending on his skill in the use of the simple tools then known to the trade, rather than to the advantages of new appliances.

As showing, however, that some thought has been expended in the direction of improved methods of moulding, we illustrate herewith a device of R. B. Swift, of Cleveland, Ohio, a practical moulder of long experience, for moulding such work as gear wheels, pulleys, and similar pieces, from a sectional pattern, which we are informed has been adopted by some large manufacturing concerns to their satisfaction, not only in the saving of time, but in the quality of the work produced.

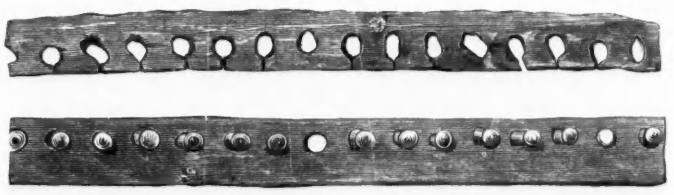
In drawing the segmental pattern used in making a casting there is always the danger of tearing up the mould. Further, it is sometimes very desirable to make a casting in green sand of such form that it would be impossible to draw the segment directly. The object of this device is not only to provide against the breaking down of a mould with a plain pattern, but to provide for using sectional patterns of such forms as cannot be directly drawn, such as crowned faced pulleys, grooved friction wheels, etc.

Referring to the engraving, which represents a mould in process of being made, the use of this device may be explained. The segment pattern is shown attached, and, as will be noticed, the spindle is embraced by two half boxes, which are made to accurately fit it. These boxes are fitted to be moved in jaws by means of the screws *E E*. In use, the segment pattern—whatever it may be—is screwed in place, as shown, so as to sweep *approximately* the proper radius. The spindle being in position, the radius is corrected, so as to be *exactly* right, by means of the two adjusting screws referred to, the manner of doing this being so apparent as to need no explanation. The advantage of this almost instantaneous means of adjustment will commend itself to any one accustomed to doing this class of work.

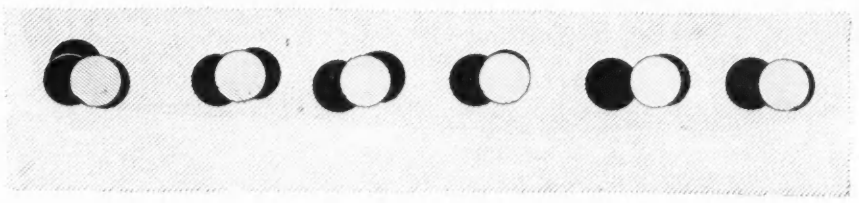
This feature alone would seem sufficient to demonstrate the value of the device; but perhaps the most valuable feature is its adaptation to the following purposes: Let it be desired to make a casting which has some projecting parts that would render it impossible to draw the segment straight. In this case either of the screws may be turned back, drawing the pattern either towards or away from the center, as may be desired, until it is free to be drawn without the possible danger of breaking down the mould. When using in this way the opposite screw to the one being used remains stationary, and serves as an accurate stop or guide by which to quickly reset the segment.

Some parts of the engraving, which have no especial reference to the device, are not referred to.

We are informed by one of the most prominent practical moulders in the country, who has had this device in use under his charge, that he considers it very valuable for the purpose. He informs us that the firm by which he is engaged has deliberately destroyed most of their large gear patterns, preferring to make their gears by the use of a segment and this device, as producing much truer work than can be made from a full pattern.



SPECIMEN OF BAD PUNCHING—FROM PHOTOGRAPH.



SKETCH OF HOLES (REDUCED.)

LETTERS FROM PRACTICAL MEN.

Boiler Explosions.

Editor American Machinist:

In answer to H. E. Gould, in the AMERICAN MACHINIST of March 25, 1882, I think he answered his own question, when he said locomotive and marine boilers are made in a superior manner and of better material than portable and stationary boilers.

Writing from the "Old Country," England, I have no hesitation in saying that not more than 50 per cent of the new stationary boilers now made, would pass the Board of Trade rules, for the pressures at which they are worked; and if we exclude recent boilers, I believe that 75 per cent of the old class would fail.

As you are aware, we have no Imperial, or Government, supervision of any kind for steam boilers in this country—only for marine boats intended to carry passengers; the consequence, is every maker or owner has his own way, which is often different to that of other people.

We have several boiler insurance companies, some of which have been working for 20 or 25 years, and have done and are doing a good and national service by improving the construction and the general working of stationary boilers. By way of giving your correspondent some evidence for my statement, I send herewith a photo, also an enlarged hand sketch of two pieces of plates cut from a boiler shell, [shown in the accompanying engravings] a short time since. They formed two of the longitudinal seams, and are a fair sample of all the rest of long seams in this boiler. You will see every hole has been double punched and a good many of them trebly punched. I fear the photo, and even my sketch will fail to convey a fair idea of the work. It should be seen to be fairly valued.

Bad as it is, it remained tight for 20 years, carrying 50 pounds pressure to the square inch. The boiler was what we call the Lancashire type—two flued, 30 feet long, 7 feet diameter, $\frac{7}{16}$" plates, pitch of rivets in long seams, 2.05"; but the section of plate between rivets was in some places reduced to 26 per cent. of the strength of the solid sheet.

In a future letter I may give other examples of boiler construction and working, illustrative of how boiler explosions come about, such as I have seen in a long experience as a BOILER INSPECTOR.

Accrington, England.

Standard Pipe Tap Taper.

Editor American Machinist:

In the issue of the AMERICAN MACHINIST of April 15, an answer to an inquiry from "J. H. E," of Boston, seems to imply that the Pratt & Whitney Company have established the standard taper for pipe taps as one inch per foot. In so far as the work produced is concerned, this has been the taper adopted, having been considered correct, at the time, without reference to the best authority upon the subject, and based more upon the opinions of individual users than upon a generally recognized standard. It is only recently that the fact of its being incorrect has been clearly demonstrated, and that three-quarters of an inch per foot should be adopted as the standard taper, this being in accordance with a communication received from Robert Briggs, C. E., of Philadelphia, who is well known as having originated the standard sizes and taper for pipe threads, when connected with the Pascal Iron Works of that city, as early as 1862.

A fitting tapped a taper of one inch per foot, and having a pipe screwed into it, with a taper of three-quarters of an inch per foot, certainly results in a steam tight joint, as the end of the pipe thread first receives the crowding, due to the inequality of taper, where the fitting is the strongest, and the joint is likely to be fully as tight as if the taper of both are alike.

As for the variation between one inch and three-quarters of an inch per foot of taper in so short a length, the well-known energy of the much abused plumber and steam fitter, would soon reduce this incompatibility to an imaginary evil.

The standard taper of three quarters of an inch per foot having been adopted, and standard gauges made to conform to this basis, will, it is hoped, remedy the difficulty, and serve to bring about in this, as in other standards, a more general uniformity, the Company not arbitrarily assuming any special taper as standard, but being willing to conform to what is indisputably the best authority.

THE PRATT & WHITNEY CO.

Hartford, Conn.

Square and Round Shank Drills—A New Drill Chuck.

Editor American Machinist:

One of the first things *mechanical*, which a boy who has got a new jack knife attempts to do is to drill holes with the point of the blade; the boy usually shuts the blade on his fingers, and accomplishes more howling than drilling. If, however, by good luck, he does escape cutting his fingers and bores a hole, or a series of ornamental holes in the parlor furniture, the result will often compare favorably, as a mechanical piece of work, with that of some so-called machinists when they attempt to drill holes in anything. Now, the machinists I speak of will get a hole chawed in by hook or by crook, bull strength and awkwardness, but when the work is accomplished it would hardly be a disobedience of the Second Commandment to worship it, for it will not bear the likeness of anything "in the heavens above, or in the earth beneath, or in the waters under the earth," except, perhaps, that other hole which was punched in the snow with a crooked stick.

There is probably no other one kind of work, of which there is more done in the construction of machinery, than drilling; and by drilling I mean, as well, counter-boring, reaming, etc, when holes are to be made, trued or enlarged.

It would take a very large book to describe all of the different kinds of drills and how to make and use them, and I may hereafter have something to say on this subject; but now I want to say something about that chief of all abominations—the square, taper-shank drill. I think they were especially designed to make a man say bad "big D's;" and, if that was the intention of the designer he has met with undoubted success. Some other fellow, however, made an *improvement*. He added a set screw to the square socket.

I don't know but what I will stir up a *hornet's nest* about my ears for saying all this, for I have seen these abominations advertised, even within the last ten years. I have also seen drilling machines which were made within the last twenty years which had them on, and there may be some shops where such are still in use. I don't like this kind of drill chucks—I call them "sooner chucks;" sooner chuck them into the scrap heap.

There are a great many different kinds of drill chucks on the market which are good, some are better, and a few are best. I don't want to tell which I believe is best, for the reason that some of your readers may think I am writing an advertisement, so I will not give my opinions.

I see you have been publishing my articles under the head of "*Letters from Practical Men.*" Now, I do not, by any means, claim to be a practical man, for the reason that I am not now, nor have I been for very many years, in any way connected with, or working in a machine shop. This confession may save me from too sharp a criticism when I *go after* some abomination, or suggest some old, or perhaps played out, idea, believing it new or useful.

I used to think that for a plain, simple drill, collet or chuck there was nothing superior to a plain, straight, round hole, with set screw. Drills and other like tools were quickly and easily fitted, and would always run true after having once been adjusted. This chuck was easily made, and for forged, flat drills I used to either turn up a lot of blanks, get round polished tool steel of size to fit, or else have the shank swaged to size hot; the last is probably as good as any for common drilling, as it may be easier and quicker done.

There is one thing about this kind of chuck which I never did and never can like; that is the set screw. I am a great unbeliever in having any piece of moving machinery with a set screw or other protuberance, when the same can be avoided. I have had my battles with them, and can show many honorable scars as the result. I don't know that these scars ever did me any particular good, and I am quite sure that my battles never did the set screws any harm. I believe that I always got the worst of it.

In looking over my old notes, I find a design for a chuck which does away with the set screw. I know that it is not so good for twist and other turned drills as a universal one, but think it would be very good for common forged drills "and *sich*." Now, I have never made one of them; but, with your permission, I will tell you how I *would* make one if I were running a shop. I believe that a chuck made on this plan would be first rate; but if any one should make one, and it does not prove good, don't blame me. I never saw or heard of one; the plan is purely ideal. The accompanying sketches will show not only the plan, but the proposed method of construction.

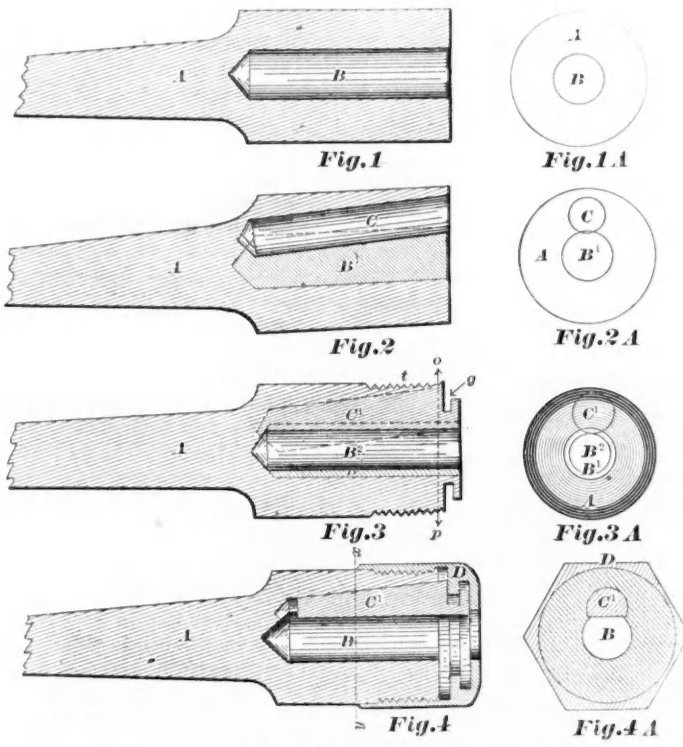


Fig.1 Fig.1A Fig.2 Fig.2A Fig.3 Fig.3A Fig.4 Fig.4A

A New Drill Chuck.

First. Have the forging *A* made of good steel and well annealed; center; square up the ends, and fit the taper shank to the drill or lathe spindle; then drill the hole *B*, and ream it to the required size with a Rose bit (see Fig. 1 and 1*A*).

Second. Fill the hole *B* with a tight, well-fitting plug B^1; then square the end off the plug even with the chuck; drill and ream the hole *C*, as shown in Fig, 2 and 2*A*.

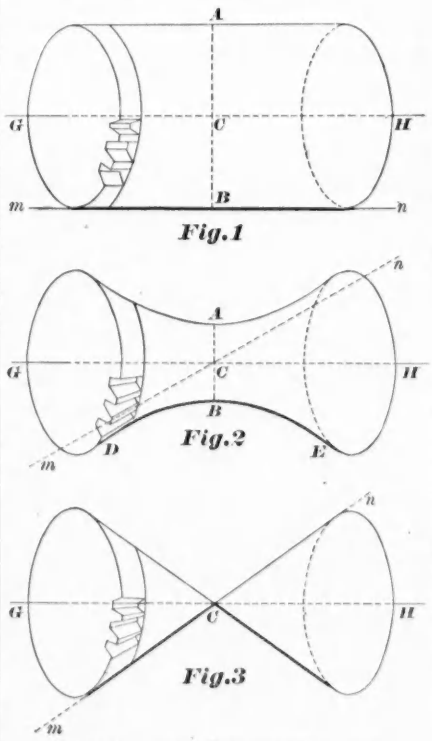


Fig.1 Fig.2 Fig.3

Sketches for Turning Tapers.

Third. Fill the hole *C* with a well-fitting steel plug C^1; drill the central hole B^2 about $\frac{1}{10}''$ or $\frac{1}{8}''$ smaller than the hole *B*, turn the groove *g*, and cut the thread *t*, as shown in Fig. 3 and $3A^1$; remove the plug C^1 and the remaining shell B^1, and turn off the end of the chuck to the line *o p*; flatten the plug C^1 down to bottom of the groove made in it when drilling the hole B^2, and fit so as to slide snugly and easily in the hole *C*; harden the plug and draw to spring temper.

Fourth. Make the nut *D* of Norway or Swede iron; fit as shown in section in Fig. 4; after finishing case harden.

Fig. 4*A* shows a section through the line *xy* of the finished chuck, Fig. 4.

Try this chuck, and let the American Machinist know how you like it.

I would be very glad if some advocate of the square taper drill shank would tell what its advantages are, if any.

Helena, Montana. Geo. B. Foote.

Making Memoranda.

Editor American Machinist:

I like the ideas of the old engineer, whose motto is, "Put that in writing," or words to that effect. The action of the mind in forming a sentence to write down, compels a closer scrutiny of the subject and dispels indistinct, confused ideas, and makes an impression on the mind that can be more readily recalled, for once having been seen in writing. The relative areas of different circles, the adhesive power of belts, the weight of a cubic inch of iron, and the many other useful rules which we get from the text books and the American Machinist, and which we so readily call to mind, were first thought out and written down by some one.

Any article that we see written or printed carries weight with it from the fact that writing presupposes thought and attention to the subject.

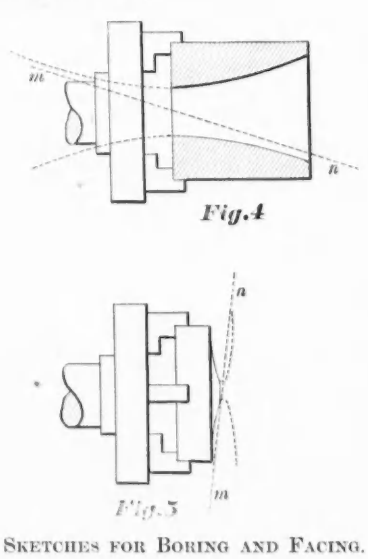


Fig.4 Fig.5

Sketches for Boring and Facing.

The best of evidence in a Court of Justice is the written memorandum made by the witness on the spot at the time of the transaction.

Smith sued Jones for the value of a pulley. Smith swears that he made the pulley just as Jones ordered it. Jones swears that the pulley was not made as he ordered it and was useless to him—no written memorandum in the case. Both are reputable men, but neither is in the habit of making memoranda. The jury may wrestle with that case all night, and Smith and Jones may worry all night, and in all human probability the result will be a disagreement of the jury. Smith will lose his case and his customer, and will have had all that worry for nothing, and worse than nothing, when, if at the time of taking the order he had made a careful memorandum of it, and then read it back to Jones for his approval or correction, and had Jones sign it no trouble would have arisen, or if there had, Smith's memorandum would have saved him.

It is not the principles of philosophy and mechanics that tax the brain. They are as easily carried in the head as the multiplication table. The daily events and transactions, with one thing crowding upon another are what tax the mind and consume brain power, and a thing that a man does not write down, and fails to carry in his head, makes him more trouble than all the rest together. Suppose that the old engineer above referred to had received that pulley order from Jones. He would have written it down and read it back to Jones for approval or correction, and no trouble would have followed. It is an easy matter to have the order, and the weight of metal and the time of finishing all together on the order book.

The old man Morton always used a plain blank book with no extra ruling. In his order book Jones' pulley order would have been entered thus:

Jan. 3d, 1882, John Jones, by self, orders one pulley 48″x12½″. Oval. Bore 3′ standard. Keyway ¾″ wide. To be ready on Saturday, Jan, 5. Casting 418 lbs

Finishing	Jan.	5	6	7	} 18 hours
	J. Curran	6	10	-	
	J. Webber	.	.	2	

Delivered and charged Jan. 7th.

The price of the pulley would have been governed by list, but Morton always kept the time and material of every job. He would then know what the work cost, and what work paid and what did not pay, and he would know what workman did that particular piece of work, and if the work was done well and with dispatch, he did not hesitate to say so. If there was any forging, or pattern making or any other work or material on the job it was put on the order in the same way as indicated. The vertical ruling was all done with pen or pencil free-handed, and notes and comments were added as occasion required. I have seen several pages taken up with the work of a single order, and it would all be clear and plain, and could be referred to for years afterwards. Anthon.

Defiance, O.

Turning Tapers—Gearing.

Editor American Machinist:

The discussion of "Turning True Tapers," by Geo. B. Foot, Feb. 4, and A. S. Alden, April 8, current volume, are very good and correct. The only strange thing about it is that there should be anybody who should continue to doubt the fact, because, if any one should not understand the explanation given in the paper, it would be such a very simple matter to give the subject a "practical test" by simply turning up a block of wood under the conditions represented; exaggerating the conditions somewhat will make the result much plainer. Such an experiment will cost nothing except about a half hour's work, and hence there is no excuse for any one to remain in ignorance on this question.

The fact, when reduced to its general principle, is simply this: Every piece of work turned in a lathe is a part of an hyperboloid, as represented, generally, by Fig. 2. Two limits of the hyperboloid are represented by Figs. 1 and 3. Fig. 1 is a true cylinder and is produced when the point of the tool moves in a line parallel to the axis of the work. This corresponds to ordinary straight turning. The other limit, Fig. 3, is a true cone and is produced when the tool point moves at an angle with the axis of the work and intersects the same at some point, as *C*. This corresponds to the turning where the tail spindle is "set over," and the tool point "on a level with centers." All the variations which are between these two extremes are represented, in form, by Fig. 2, and are produced

when the tool point moves in a line which is neither parallel to, nor intersects the axis of the work. This corresponds to the case where the tail spindle is "set over" and the tool point higher, or lower, than the lathe centers. The point where the tool point crosses the axis of the work, will always be the center of the hyperboloid, as at *C*, and half the diameter (*B C*) at this point will be the distance the tool point is set below the lathe centers.

The same results will be obtained in boring work in the chuck, as shown in Fig. 4.

The same result is also shown in Fig. 5, in facing work, when the spindle is not square with the cross-feed and the tool below the lathe centers.

In boring work with the boring bar the hole will be oval (an ellipse) instead of round, when the work does not move perfectly parallel to the line of centers.

The hyperboloid represents the general form of gear wheels used in transmitting power from one shaft to another. Fig. 1 corresponds with the spur wheel used where the shafts are parallel. Fig. 3 corresponds to the ordinary bevel wheels used where the two shafts meet at any angle. Fig. 2 shows the general form of the gear for transmitting power between two shafts when one passes over the other. These are usually called "skew bevel wheels." The line *m n* which represents the path of the tool is the direction the teeth should be cut.

If more information of these facts is desired, reference may be made to any analytical geometry for the properties of the hyperbola, and works on gearing, among which are Prof. Rankine's *Machine y and Mil Work*, pages 146-155, Willis' *Principles of Mechanism*, pages 32-42, etc. C. A. SMITH.

Providence, R. I.

Two Disputed Announcements.

We publish below a communication in explanation of which we wish to state:

(1) That our announcement as to the action of the "Mechanical Engineering Section of the Franklin Institute," with reference to the adoption of a national standard system of gear teeth, &c., was based upon an official notice addressed to us, signed by "Robert Grimshaw, Recording and Corresponding Secretary," and written upon the printed letter head of the institute, to the effect stated by us.

(2) The names of the professional men which we published, as associated with Dr. Grimshaw for some investigating business, were given us with notes about the organization just as we published them by Dr. Grimshaw himself.

Editor American Machinist:

In the AMERICAN MACHINIST for April 22d is an announcement that "the Mechanical Engineering Section of the Franklin Institute has decided to choose and recommend a national standard system of gear teeth," etc.

I beg you to be kind enough to correct the above in the next issue of the AMERICAN MACHINIST that that section has not authorized any such announcement, nor has it invited manufacturers to furnish data about gearing.

Some weeks ago there was an announcement in the AMERICAN MACHINIST that some professional men (giving their names) of Philadelphia have associated themselves with Dr. Robert Grimshaw for some investigating business; and, as my name was used therewith, I beg to say that there has been no such society formed. JOHN W. NYSTROM.

Philadelphia, April 14.

Continued from page 3.

is, whether among the working men or among the engineers, it was "Our Holley;" and it is to "Our Holley" that we do to-day seek to pay our tribute. In my reflections on the death of Holley, I think of the death of his friend and fellow-worker in the organization of this society, Henry R. Worthington, and think of the loss the society has sustained. I remember visiting Mr. Worthington's office, and finding him holding a message in his hand, and in eloquent, heartfelt words pouring out his sorrow, saying that the message contained news from Holley in England that "Holley was dying." How past all comprehension is the life of man! Worthington died and Holley came back.

WILLIAM METCALF: In 1874 I had the pleasure of first meeting the man whom we have to-day met here to honor.

It was my fortune to drop into one of the machine shops of our city, and over there in one of the corners, I found a man who was introduced to me as Alexander L. Holley. He had a bright face, a sweet smile, clear, intelligent, flashing blue eyes, that are just as clear in my mind now as then. It was through his influence that I became a member of this society. To him I owe the great honor of having had the nomination to the office of President of the Mining engineers. In speaking of Holley I hardly know what to say to express my sadness. Of his career, his professional work, and his active energy, many gentlemen here to-day know far more than I do. We all know why we love Holley—simply because we could not help it. Not merely because he was sweet tempered, as very insipid characters may be sweet tempered, but because he had intelligence in more than one path. No one learned to know him who was not the wiser for it. Holley's profound knowledge and great variety of attainments drew all towards him whether we would or not. In a word, Holley was great in the far seeing apprehension of the utility of things. He had the enthusiasm of a zealot, the courage of one convinced, and the energy of inspiration. He seized upon the Bessemer process when capitalists were afraid, and when ignorance and prejudice derided it. When a slumbering world had no idea of its nature, he gave courage to capital and beat down ignorance and prejudice. Holley said to the capitalists: "Give me your money and I will span the great chasm between now and to-morrow. I will blow to atoms mountains of ignorance and prejudice, and you shall float upon rivers of wealth." He took their dollars, and converted them into millions. How could this man, poet, artist, litterateur, succeed in such a task? He did it, because he had confidence in himself. What I have said seems as nothing, and I can think of no words that will express my feelings more plainly than those of a friend I met the other day, who said, "I cannot tell you how I loved him"

The President: There is a gentleman here who was a co-worker of Holley, from whom we would like to hear—Mr. Charles T. Porter.

CHARLES T. PORTER: In coming here I confess to you that it is not to speak of him who, as the foremost figure, did so much for the industries of this country; that beaming countenance with speaking eyes was the outward manifestation of a great soul. I have had opportunity to study his character during the past few years, and I formed an estimate of him that I cannot express. His character was warm, generous, and full of sympathy. It seems to me, that to whatsoever things are just, whatsoever things are pure, whatsoever things are noble, to all such things he was ever loyal. With each his heart beat in perfect harmony.

In engineering circles, however, where his influence was felt more than anywhere else, and where he was so much admired and beloved, there can be no doubt that we may write his name among those who not only have added to the material goodness of his fellow men, and not only have helped to contribute largely to the advancement of civilization, but through whom men have been made better; have been made more just; have been made more generous, more true, more loving.

J. C. HOADLEY: It would be futile for me to attempt to express the feelings I have long cherished toward our dear friend Holley, and it would therefore be idle for me to dwell at any length on his career. Almost twenty-five years ago, when he was a very young man, I intrusted to him a very delicate negotiation in England. He performed this trust with great tact, and declined to receive any compensation, except a trifling compensation for expenses. His character was so transparent, it spoke so plainly in his clear calm eyes, that we always knew the moment we saw him, that he was as sound a man in heart, in mind, in character, in every respect, as there was in this or in any profession. His life was right. In all that relates to the highest problems of life, his mind was clear, poised, and fixed upon firm conviction. I need not say I loved him, we all loved him, none knew him but to love him.

J. F. HOLLOWAY: It is now nearly twenty years since I first met Alexander L. Holley. At that time, at the request of some gentleman of Cleveland, that I should look into the Bessemer process, I made a visit to Troy, for the purpose of seeing its manufacture. I went out to the factory which was on the outskirts of the town in a quiet place. In the office, among other things, there was a table and upon one side a row of shelves, and upon the table and the shelves there were bars of steel, and sections of rails, and bits of iron and steel twisted into various shapes, all tending to illustrate the elasticity of the metal made by the process.

Holley came in, and I was a little disappointed when I was introduced to him, as I looked at the slender young man before me; but his bright countenance and his manner left an impression upon me that years could only deepen, and time could never efface. I was taken through the workhouse and was shown all that was accomplished up to that time, and it was little enough. I remember how he spoke of his boilers, and the inefficiency of the water power, and other faults, and how patient he was. He said, that he thought when they had new boilers and better water power and a vessel that would stand better and could come across the right kind of pig iron it would be all right.

The incident well illustrates the hopefulness of Holley's character, and shows us how he triumphed over all his difficulties in bringing the Bessemer process to its present state, making railway travel safe and pleasant. To his work as a man we all bear testimony.

In things relating to his business, he was easy; in society he was brilliant and ranked with the first. In all social gatherings where wit and mirth held sway, he was the foremost to make himself felt, and the last to offend. His was a noble manhood, disarming all criticism, making no enemies and winning all hearts.

COLEMAN SELLERS: The main points in Holley's life and character have been so well stated, that I shall confine myself to a little incident that occurred during my own acquaintance with him, begun many years ago. Though at that early date his attention was mainly attracted to locomotive engineering, I well remember one of the many talks that we had about many matters. He told me among other things that he thought of delivering a lecture on architecture, as applied to building for manufacturing purposes.

He asked me if I had been at Chicago since the fire, and if I had seen the wonderful buildings recently put up there. He spoke of the lack of regard for fitness and propriety which had been shown there in putting up signs, and covering the beautiful architecture of the buildings. He said the whole city of Chicago was covered up with black and gold, though millions of dollars had been spent in the highest architectural skill. It is useless for me to say anything about his generous qualities, and I have only given this as a little tribute to his memory.

The President: You remember the call of the society was issued by Professor Sweet, as the moving spirit in the organization. But there is an inside history. He was assisted by two or three friends, who have helped to advance this organization very much in the preliminary work, and the work preparatory to organization. Among these one is present with us to-day. I find on the list of the committee the name of an ex-officer of the society, the gentleman who has, until recently taken charge of our funds, and to whom we are greatly indebted, Mr. Moore.

LYCURGUS B. MOORE: In accepting with diffidence, and—I am not ashamed to say it—in accepting with tears, the opportunity to add a few words to the tributes already paid, if anything can be added that has not been better said, it has seemed to me that there is no truer way to honor the dead than pointing a moral for the living.

In the illustrious life, the close of which we meet this day to commemorate, there are two or three suggestive features, which have especially impressed my mind.

One is the genial light-heartedness that not only made Holley so agreeable as a man, but that also helped so largely to make him what he was as an engineer. Nor was he one of those who, by nature, doleful and somber, strive to cultivate a cheerfulness which they do not feel. To me it always seemed that Holley was one who could never, by any stress of circumstances, be borne down, or become permanently soured, because he carried within him the ingredients that go to make up mental health and moral sunshine. His mind was not burdened by the habitual croakings and uncertainties and dejections that are so often mistakenly deemed the ripe kernels of thought, when they are only the husks that hide or smother it. Then, too, closely connected with this trait of his character, and reacting upon it, was entire freedom from the petty spites and personal and professional jealousies, which too often disfigure abilities of even the highest order. Holley's career is additional proof that it is mainly the light-hearted and buoyant-minded men who rule the world.

Another reminder that runs logically with this serves to show us, from Holley's example, how largely the world's great enterprises are to-day in the hands of young men. Before the age of thirty-three Holley had practically grasped the steel-making secrets, which were so to change the methods of trade and transportation, and to influence all the arts and sciences and social structures which are built upon these two great foundations. Let us learn anew from the life of Holley that, though gray hairs are honorable, a great truth, or great discovery, or great work, is not less worthy because youth is behind it, or at the bottom of it.

The only other thought regarding which I shall presume to add a word of comment is this: Holley's career well illustrates the broadened plane upon which men can in our day meet and study nature. In our modern life creeds and customs are chiefly valued in proportion as we are content to accept at second hand. A mind like Holley's has less need of creeds, because it is one of the makers of customs for mankind. Living, as he did, close to the universal heart of nature, and reading her secrets, as in a half-opened book, it was one of the privileges of Holley's genius to prove to us that there is in nature a beauty which even art cannot portray, because in this beauty are embodied the forces which make art possible.

With your permission, I should like to conclude this thought by reading a few lines, the idea or suggestion of which, singularly enough, dates from a commemorative gathering, at which Alexander Lyman Holley was the moving spirit. Let me entitle it:

THE NEW NATURE.

In the old days
Men walked with Nature in the quiet wood
And found her features beautiful or good,
As were their ways.

Still do they look,
Painter and poet, seer and holy man,
For Nature's self, to find her where they can,
In field or brook.

But these new days
Oftimes entice from breezy dale and down
Her wandering feet into the dingy town,
Where chimneys blaze.

Are forge and flue,
Steeple and street, becoming in her sight
More dear than all the joys of day or night,
That once she knew?

That—none may know;
Her gifts are hers, to spend them as she will—
Changed or the same, Nature is Nature still,
And chooseth so.

Of all who seem
To seek her face, one asks, whom do her eyes
Rest kindliest on? Nature herself replies
(So we may deem)

To him that asks:
"The wine is given to him that hath the cup—
Use is but beauty girded strongly up
For kindred tasks."

A few appropriate remarks were added by A. H. Emery, W. Barnet Le Van, and Wm. E. Partridge, for which we regret that our space is inadequate. Then the meeting adjourned.

The reception tendered the society by the citizens of Philadelphia on Wednesday evening, at the Academy of Fine Arts, was a splendid affair, about one thousand ladies and gentlemen being present. The reception committee consisted of George B. Roberts, A. J. Drexel, Geo. W. Childs, George H. Boker, Dr. Wm. Pepper and Fairman Rogers, all prominent citizens of Philadelphia.

The local committee having charge of the entertainment, as well as the excursions to places of interest on Thursday, deserves the highest commendation for the completeness of detail and generous manner of providing for the guests.

AMERICAN MACHINIST

PUBLISHED WEEKLY

BY

American Machinist Publishing Co.

Horace B. Miller, Prest.

Jackson Bailey, Vice-Prest.

Lycurgus B. Moore, Treas. and Sec'y.

96 Fulton Street, New York.

Jackson Bailey, Editor. Horace B. Miller, Business Manager.

Lewis F. Lyne, Mechanical Engineer.
F. F. Hemenway, Associate.

The American News Company,
Publishers' Agents, New York.

The International News Company,
11 Bouverie Street, (Fleet St.) London, Eng.
Will receive subscriptions for the American Machinist at 16/8 per annum, postage prepaid.

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NEW YORK, MAY 6, 1882.

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Importing Machine Tools.

The builders of American machine tools have very little to fear from foreign competition; but it is worthy of note that some English tool builders are making efforts to work up a trade with American customers. A number of orders have been placed in England this year for machine tools to be imported, some of which have been filled. In a late issue of the London *Ironmonger* we find in the Birmingham market report, the following:

"Even with the United States there is a good trade just now in certain classes of stocks and machine tools adapted to railway and engineering purposes;" and again, in the same issue, in the Lancashire review: "During the past week considerable orders for general locomotive tools have been placed in this district by representatives of the large American railway companies, and a portion of the requirements for the same company have also been covered in Leeds."

We have been informed as to the operation of some heavy machine tools lately purchased from English makers. They are considered strong and durable, but are far behind American tools in the amount of work they will do in a given time. They cannot be speeded up to American requirements; and, as "time is money," most emphatically in machine work, they have been found to be the reverse of economical, although costing something less than standard tools made in this country. Unless we are very much mistaken, it is a bad place to look for orders for English machine tools in any shop in the United States where any of them have been in use. The rush of orders for machine tools, and the consequent delay in getting them filled, has undoubtedly had a tendency to cause some parties to go abroad to secure what they required. When orders can be filled upon as short notice as they could be two or three years ago, we will not be likely to hear much about importing English machine tools.

Mechanical and Professional Education.

It would appear to be the general belief that it requires talent of a different and a higher order to insure success in other of the affairs of life than it does to succeed as a mechanic. This is one of the commonly accepted fallacies, which, without foundation in fact or reason, has been productive of a great deal of harm. Acting from these considerations, a boy who is thought to be too dull to get along in any of the so-called learned professions, is believed, without any preliminary preparation, to be as sure of success in a mechanical direction as any one.

Probably the foundation of this fallacy would be found as far back as the time when there was supposed to be no occasion for a man who worked with his hands to make any particular use of his head. However this may be, this fallacy, handed down through hundreds of years, clings to the present time like many another false idea that ought to have disappeared generations ago.

The young man who looks to mechanical pursuits for a vocation, should in the beginning divest himself—and in this he should be assisted by those of greater experience—of the idea that the great end and aim of his life is to become an adept in the use of the tools of some trade, or that there is not in the direct line of what he has set out for quite as much room for the exercise of all the faculties of the mind as there is in any other direction in the world. In other words he should start out to learn something quite different from the commonly-accepted idea of a trade—something to which the skill of his hands is only secondary. Not by any means that the acquirement of the highest degree of manual dexterity should not be striven for, but that from the beginning he should fully appreciate that this is only incident to the real business he is to learn.

The young man who is destined for one of the professions is fitted by a course of study, not educated for the profession, but fitted so that when he comes to the practical part of it he shall be in a condition to educate himself. It is considered in his case, and rightly enough, that a system of training is absolutely essential to success, and so some years are devoted to the task of learning how to learn.

In the case of the prospective mechanic it is not thought that any preliminary training is at best more than a convenience. The difficulty, however, is not entirely, nor mainly, that the prevailing idea combats the theory that a young man who is to follow mechanical pursuits should be taught to reason systematically by some sort of previous educational training, but that the sentiment is not impressed as it should be that as he learns to use his hands he should just as systematically learn to use his higher faculties. In a word the popular idea of a trade needs to be vastly enlarged, and made to comprehend what really constitutes a mechanic. In this way a young man may be able to understand in the beginning what it sometimes takes him years to learn—takes him so long to learn what to do that he never begins to do it.

It would be foolish to call a man a surgeon who knows how to cut, but not when or where. It is equally foolish to call a man a mechanic who knows how, but not when or why to do a thing.

Another fallacy, and one that has much to do with fostering the belief that it is not worth while to interest anything but muscle in the case of the mechanic, is that there is not so much ahead of the mechanic as there is ahead of the professional man.

This, notwithstanding it is contrary to all facts, is the prevailing opinion.

If from 200 boys, 100 are taken, indiscriminately, for any of the professions, and the other 100 are devoted to mechanical pursuits, *giving each equal advantages* in the way of preparation and education, each with the special object in view; in the end the average condition of the mechanics will be the best. Not only this, but the probability of some of their number reaching a position of eminence before the world is also better. There will be more absolute failures amongst the professional class than amongst the other, that is, failures to make a respectable living, because that part of the business done with the hands alone will be worth more to the mechanic than to the other.

Nothing is more essential to the mechanic than an appreciation of the fact, that quite as much as the professional man he needs an education other than that of the hands; in other words that becoming a skilled workman is only one of the means to an end.

Improvements In Machinery Catalogues.

One of the most important elements of the machinery business is to sell the machinery after it is ready for market, or to secure orders for it before it is constructed. This includes the necessary expenses for engravings and for printing circulars and catalogues. Establishments that make a variety of different machines, are obliged to incur considerable expense in publishing catalogues—the cost frequently mounting up into thousands of dollars.

It may be easily seen that any method of preparing these catalogues that will give the same information in much less space than heretofore occupied, and just as forcibly, must, if employed, effect a large saving in money, to say nothing of time, required for getting out these publications. We have given the subject a good share of attention, and have examined a large number of machinery catalogues, finding in many of them a decided similarity of expressions in the printed descriptions, also a frequent repetition of certain expressions in describing the various machines in the same catalogue. We have essayed to formulate the most commonly used expressions of this kind so they may be published *once* only in making up a catalogue, each with a proper letter of designation, and mentioned in descriptions of the machines only by the appropriate letters. The saving in printing some catalogues, we have observed, were this method followed, would be hundreds—if not thousands—of dollars.

We have made up the list of common expressions used in describing machinery which is given below, and must here remark that we claim no originality for any of the expressions themselves, but will claim credit only for compiling them in convenient form for the purpose herein mentioned.

A—All its parts are correctly proportioned and accurately fitted.

B—Bed is rigid and the legs are made from an improved pattern.

C—Combines simplicity, efficiency and durability.

D—Does more work and lasts longer than any other machine of its kind in the market.

E—Every machine is thoroughly inspected before leaving the shop.

F—Fills a want long felt.

G—Guaranteed superior to any other machine made to do the same work.

H—Has an unusually large capacity for turning out work.

I—Is finely finished and neat in appearance.

J—Journal bearings are long and smooth.

K—Kinks and devices of a superior kind are employed in its construction.

L—Lost motion resulting from wear can easily be taken up.

M—Machine is not liable to get out of order.

N—Neither pains nor expense have been spared to make it the most perfect machine of its kind.

O—Outlines are graceful and the machine is strong and substantial without being clumsy.

P—Parts subject to extra strain are made extra heavy.

Q—Quantity of work it will perform in a given time can not be surpassed.

R—Requires less power to run it than any other machine that will do the same work.

S—Satisfaction in the highest degree has been given by every one that has been sold. Should be seen to be appreciated.

T—The workmanship is first-class in every respect.

U—Use only the best materials in its construction.

V—Very best machine of its kind before the public.

W—When any part gets broken it can be readily taken out and a new one made to take its place at a comparatively small expense.

X—X-cels all other machines of the kind in its ease of manipulation.

Y—You can depend on the gears being accurately cut.

Z—Zeal and ability of a high order are displayed in its wonderful adaptation to the work it is designed to accomplish.

&c—For further particulars as to prices, etc., address the manufacturers as above.

By using the above list by letter, as we have mentioned, many descriptions of machinery, which are made to occupy two or three pages of a catalogue, could be brought into less than half a page, thus effecting a marked economy in paper and printing. A description could start off, for instance, with "*B, C, F, H, L, M, N, S, W* and *Z*," which would take but a single line. Then could follow some specific information which the buyer of such a machine would be most likely to want to know. The advantage of this plan to the prospective purchaser would be the facility of getting at the particular information desired at once, without spending unnecessary time in reaching a long statement of general characteristics. The latter he could take in at a glance, after familiarizing himself with the above indexed list. There are, however, machinery catalogues in which the above plan would not prove of any advantage, inasmuch as the points of general excellence are not dwelt upon in the description, the latter being confined to specific information. But the catalogues to which the plan will apply with economy are by no means few and far between.

A Pittsburgh firm, Atterbury & Co., have recently had granted to them a patent for the manufacture of glass shingles.

One of our contributors, C. A. Smith (Votre Ami) has received a private letter from a draughtsman in one of the largest machinery establishments in the West, in which he says: "I was very glad to get a solution of the cone pulley question and your solution is indeed fine. I had occasion to make use of it the very next day after I read it."

Literary Notes.

THE LOCOMOTIVE. Volume II. New Series. 1881. Published by the Hartford Steam Boiler Inspection and Insurance Company.

This book contains 192 pages of matter relating more particularly to boiler explosions, with plain, practical, illustrated descriptions of investigations of causes and results. The volume also contains many able and instructive papers on the subjects of boiler construction and proportion, strength of materials for the same, care and management of steam boilers, causes of deterioration in strength of steam boilers, iron *versus* steel for boilers, preservation of boilers, inspectors' reports, corrosion, incrustation, circulation, tubes and combustion, besides a large quantity of interesting miscellaneous matter of a very valuable character to engineers, and other persons connected with, or interested in, the use of steam.

STEAM ECONOMY, AS ILLUSTRATED BY THE USE OF THE STEAM ENGINE INDICATOR. Practically Considered; being a Reflex of Actual Tests. By A. Wilkinson, M. E., late of the United States Navy. 124 pages. Price, paper 75c., cloth $1.00. Published by the author, 123 North Fourth Street, Philadelphia, Penn.

In the book bearing the above title, the author has endeavored in plain figures, and problems in simple arithmetic, to give the most desirable portion of numerous tests of steam engines, made by him during his long experience as a practical engineer. The importance of the valve adjustment is set forth in a manner which deserves consideration, and the steam engine indicator is advocated as the only reliable instrument for pointing out the defects in steam engines.

A large number of indicator diagrams are shown in connection with the records of tests made, illustrating the performance of different valves with their respective motions, and the behavior of steam in the cylinder. A number of tables are given of the indicated horse power of automatic cut-off steam engines under varying conditions of speed, initial pressure and different points of cut-off. Tables are also given of the strength of material, among which are those showing the internal pressure upon boiler shells from 24" up to 80" external diameter. The following subjects are also treated upon: Boiler explosions; Belting; Steam Economy, not fuel economy; Suggestions upon Building and Operating Steam Engines and Boilers, besides other kindred subjects which properly belong to those already mentioned.

The Century Magazine for May begins a new volume. It is bright as ever, and full of interesting articles. The engravings are all specimens of fine art. Among the articles in the May number are The Canadian Mecca, Carlyle in Ireland, Opera in New York, Russian Christianity versus Modern Judaism, George Innes, Through One Admistration, The Hellenic Age of Sculpture, and James Russell Lowell, all of which are illustrated.

The Massachusetts Institute of Technology, of Boston, has decided to proceed immediately to the erection of a building for workshop purposes. This is one of the best institutions for instruction in the mechanic arts in the United States.

The Second Annual Exhibition of the New England Manufacturers and Mechanics Institute is announced to be held in their new permanent building in Boston during the months of September and October next, beginning Sept. 6th. Applications for space will be received until July 1st, and goods must be ready to be placed by Aug. 1st. The circular states that there is a carpenter shop, paint shop and pipe-fitting shop in the building and that work will be done in a satisfactory manner at reasonable prices for accommodation of exhibitors.

Questions & Answers.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

(149) B. S. S., Lagonda, Ohio, asks: How are anchors forged? *A.* There is nothing especial in the process.

(150) E. B., Columbia, Pa., asks: How shall I remove water stains from nickel plate? *A.* Try cleaning with tripoli mixed with linseed oil.

(151) H. A. D., Cincinnati, Ohio, writes: I am running a Corliss engine and have trouble in keeping the bright work polished as the heat colors it. Can you suggest any way except by scouring? *A.* No.

(152) F. P., Boston, Mass., asks: What do you mean by the mean pressure of a steam boiler? *A.* We do not know to what you refer except it may be to the record of some boiler or engine tests. In making such tests it is customary to record the boiler pressure at intervals of say 15 minutes, and from this record to find the mean pressure for the whole time. This is usually referred to as the average (or mean) boiler pressure.

(153) C. A., Cincinnati, Ohio, writes: I am a young man 17 years old, a native German, have a good school education; am only one year in this country. What do you think would be the best for me to do—learn a trade or some other business; I think well of the machinist trade, also of phonography, but don't know which is the most desirable and profitable for me. I like phonography, but am not sure whether I can make a good living at it. What advice would you give me? *A.* We should advise you to follow your inclination in the matter. There is plenty of room in either direction.

(154) J. H., Philadelphia, Pa., writes: I wish to make some spur wheels, 100 teeth, 3-16" pitch. 1. How large shall I turn them? *A.* To find the pitch diameter of a wheel: Multiply the pitch by the number of teeth and divide the product by 3.1416. Reduce the pitch (3-16") to a decimal for convenience and

$$\frac{0.1875\times100}{3.1416}=5{,}968 \text{ inches, the pitch diameter.}$$

The total diameter of the wheels may be 6-10 of the pitch larger than the pitch diameter 6-10 of 3-16, $0.1875\times0.6=0.112$ inches, which, added to the pitch diameter make $5.968+0.112=6.08$ inches, which is the diameter to turn the wheel. 2. If I have a 6" wheel to cut with, say, 70 teeth, how can I find the pitch? *A.* Multiply the pitch diameter by 3.1416 to find the circumference, then divide the circumference by the number of teeth to find the pitch. Applying this to your example, $6"\times3.1416=18.8496$ the circumference, and $18.8496\div70=0.2692$ inches, which is the pitch.

(155) C. H. K., Corry, Pa., asks: 1. What size should the steam ports be in each of two cylinders, the one to be 3" and the other 3¼" bore, the stroke of each to be 6" and the number of revolutions 200? *A.* The area of steam ports should be 5-100 of piston area for this speed. 2. Can I make the ports ¼" wide? *A.* The port ¼" wide on the 6¾" cylinder should be 7⅛" long, which would be inconvenient. A better proportion would be 5-16" x 5¾", The port for the 3" cylinder may be ¼" x 2¼", the extra length being advisable notwithstanding it increases the area. 3. Will a 28 pound fly wheel 9" diameter be heavy enough? *A.* No. The wheel may be 24 inches diameter and should weigh 250 pounds. 4. I want to connect these engines together and operate them compound, will the 3" pulley do to belt from? *A.* Pulley should be at least 12" in diameter. 5. With 50 pounds steam pressure, and making no allowance for condensation, what power will I get? *A.* About 5 horse power. 6. According to my calculation the total pressure against both pistons would be 650 pounds. Allowing this to be so, how much should I allow for friction? *A.* About 20 per cent.

(156) J. R., Quebec, Canada, asks: 1. Is a special alloy required to make sound castings of brass on iron for valve stems, and what is the process? *A.* We are not aware that this is practiced to any great extent, and are unacquainted with the peculiarities of the process. Ordinary bronze metal may be cast on iron as described, but the result is not always satisfactory. 2. How can I do simple galvanizing. See Questions and Answers, AMERICAN MACHINIST, Aug. 21, 1880. 3. How can I calculate the quantity of steam required to force a certain quantity of water into a boiler by means of an injector or inspirator? *A.* The amount of steam required would vary in different instruments and under different conditions, or may be varied to some extent at will. You cannot determine how much steam it will be necessary to pass through your injector, nor does it make much difference, since all, or nearly all the heat enters the boiler again, being manifested in the increased temperature of the feed water. 4. Which is the more economical for feeding a boiler, an injector or pump? *A.* We shall not attempt to decide. Opinions differ on this point. 5. Please inform me in logarithms, how to calculate the mantissa? *A.* Consult some mathematical work.

Business Specials.

Transient Advertisements, 50 cts. a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday morning for the ensuing week's issue.

We receive numerous inquiries relating specially to matters of private interest. While desirous to oblige our friends, we would suggest, that an advertisement of two or three lines under this heading will usually develop the desired information easily and quickly.

Portable Forges, $10. Holt M'fg Co., Cleveland, O.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J.

James W. See, Consulting Engineer, Hamilton, O.

Presses and Dies. Ayar Mach. Works, Salem, N. J.

Latest and best books on Steam Engineering. Send stamp for Catalogue. F. Keppy, Bridgeport, Ct.

Foot Power Machinery, for workshop use, sent on trial if desired. W. F. & John Barnes, Rockford, Ill.

J. C. Hoadley, Engineer and Expert, 29 High St., cor. Federal, Boston, Mass.

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

Do you manufacture Hardware or House furnishing goods you wish sold in New York? If so, address Manufacturer's Agent, care of AM. MACHINIST.

For Sale—One Richard's Indicator, nickel-plated and in good order. Address, H. L. Butler, E. High street, Germantown, Philadelphia.

Machinists' Bench Tools; largest stock in the United States. Send for Machinist Catalogue, 212 pages. Tallman & McFadden, 607 Market st., Philadelphia.

Wanted—Iron Planer about 40 inches square by 12 feet long, new or second hand at once. Send cuts and cash price to Bentel, Margedant & Co., Hamilton, Ohio.

J. W. Penfield, Willoughby, Ohio, writes to T. New, 32 John street, N. Y.: We are well pleased with the Prepared Roofing; will want more of it before long.

"Slide Valve Gears," by Hugo Bilgram, published by E. Claxton & Co., Phila., describes the easiest method known for correctly proportioning slide valves, link-motions and cut-off gears; price, $1.00.

Russell & Struthers, Wax Process for making outline engravings. Specimens each week in the AMERICAN MACHINIST. We also do Map Engraving with best facilities. Russell & Struthers, 59 Park Place, New York.

We should like to correspond with readers of the AMERICAN MACHINIST who hold, and are willing to dispose of, numbers 2, 4 and 5 of Volume II. Address, AMERICAN MACHINIST Publishing Co., 96 Fulton st., N. Y. City.

Jas. F. Hotchkiss, 84 John St., N. Y.: Send me your *free* book entitled "How to Keep Boilers Clean," containing useful imformation for steam users and engineers. [Forward above by postal or letter, mention this paper.]

Cumberland-Blossburgh Coal; the best blacksmith coal in the United States. Free from sulphur and earthy matter. Never clinks; forms a perfect weld. Shipped to all points west by C. C. & E. M. Johnson, Room 21, Coal Exchange, Pittsburgh, Pa.

"Steam Economy," by Alfred Wilkinson, M. E., 123 N. 4th St., Philadelphia. Tells how to use the indicator. Points out and remedies defects in Steam Engines. Illustrated with numerous diagrams. Great variety of practical information for steam users. 124 pp., paper, 75c., cloth, $1.00 by mail.

If you desire to keep pace with the daily progress and development of Telephone, Telegraph and Electrical matters, have a copy of the NEW YORK REVIEW OF THE TELEGRAPH AND TELEPHONE, sent to your address. Only $2.00 per annum. George Worthington, Editor and Proprietor, No. 23 Park Row, New York. P. O. Box 3329.

The Universal Calculator—A novel labor-saving machine for solving questions in arithmetic and mensuration without mental labor. The most tedious problems solved in less than half a minute. Invaluable to engineers, mechanics, and business men. Sent free for $1. Send for circular. Address W. H. Wythe, Red Bank, N. J.

Machinery for Sale.—All in good condition, and some of it quite equal to new. Ames' Engine Lathe, 13 in. swing, 6 ft. bed; Prentice Foot Lathe, 10 in. swing, 4 ft. bed; Pratt & Whitney Hand Miller; Stiles' Power Punching Press, 400 lbs. Flywheel; Leach Shears; Wire Straightener. S. McHenry, 927 Filbert st., Philadelphia.

The Student's Illustrated Guide to Practical Draughting. Price, $1.00. Lectures in a Workshop, with an appendix containing famous papers by Sir Joseph Whitworth on "Plane Metallic Surfaces," "Uniform System of Screw Threads," etc. Price, $1.00. Either work sent on receipt of price on application to the author, T. P. Pemberton, 142 Greenwich Street (P. O. box 3083), New York.

All persons are warned against negotiating for or using any interest of Letters Patent, dated June 13, 1871, No. 115,801; Nov. 16, 1875, No. 169,941, and Oct. 8, 1878, No. 208,877, claimed to be held by R. V. D. Wood, W. R. Lawrence, Wm. B. Slocum and G. H. Aldrich, of Orange Town, County of Rockland, State of New York, or any others, for such interest are null and void. J. F. Aldrich, Norwich, Conn.

Bound Volumes and Patent Binders. We can furnish Volume 3 of the AMERICAN MACHINIST, containing the full 52 issues of 1880, or Volume 4, containing the 53 issues of 1881, neatly bound in cloth, ready to ship by express, for four dollars. Either volume unbound, three dollars. "Patent Binder" for the AMERICAN MACHINIST holds 53 weekly issues in good shape. Sent to any address by mail for one dollar. AMERICAN MACHINIST PUBLISHING CO., 96 Fulton Street, New York.

Ealy's "Blue Book,"—Special classified list of Machinists, Machinery, Railway, Engine and Boiler Makers supplies, etc., with financial standing and paying qualities of all dealers and manufacturers. Much more convenient and reliable than any other work of the kind published. We also furnish full detailed written reports. Price $30 to July 1, 1882. The JOHN W. EALY COMPANY, 51 Chambers street, New York or 79 Dearborn street, Chicago, Ill.

"Extracts from Chordal's Letters," the most interesting mechanical book published. A great variety of mechanical and business topics treated in a wise and witty way that will be instructive to old and young mechanics, and interesting to everybody. As many as 150 copies have been sold in a single shop. Over 40 Humorous illustrations; 320 pages, 12 mo. Price, $1.50 per copy, by mail, to any address. AMERICAN MACHINIST PUBLISHING CO., 96 Fulton St., New York.

Manufactures.

The House of Representatives has passed a bill appropriating $400,000 for this year's manufacture of arms at the Springfield, Mass., armory.

The Graniteville Mills, Graniteville, Ga., have set two Benzon steel boilers, built by the Whittier Machine Co., with the Jarvis Furnace.

The Baltimore Bleaching, Dying and Furnishing Co., Baltimore, Md., have just put in a 100 horse power Babcock & Wilcox Sectional boiler and set it with the Jarvis Furnace.

The H. B. Smith Machine Co., are enlarging their store, 925 Market street, Philadelphia, making it 200 feet deep to accommodate their large stock of wood-working machinery and machinists tools.

The Vancluse Mill, Graniteville, S. C., have set two Benzon steel boilers, manufactured by the Whittier Machine Company, of Boston. They have applied the Jarvis Furnace Company's setting to burn wood.

The parties in power on the new Callao [Peru] Railroad, during their sojourn in Philadelphia, placed an order with R. W. Rexford, for seven 14" engine lathes to be built by S. Ashton Hand, Toughkenamon, Pa.

James Brady is now sole proprietor of the Brady Manufacturing Co., Brooklyn, N. Y. Samuel R. Trelease having assigned his interest, retires from the co-partnership. The business will be continued under the same name and style as heretofore.

The Springfield Foundry Co., Springfield, Mass., have purchased the Agawam foundry in that city, thus enlarging their capacity. The capital stock is to be increased. The officers of the company are: President, Benjamin L. Bragg; Vice-President, Charles P. Harris, of Rutland; Treasurer, Edward W. Seeger; Secretary, William A. Harris.

The Wharton Switch Company, Philadelphia, are now building extensive works at Jenkintown, Pa. The Providence Steam Engine Company have taken the order to supply them with engine boilers, pumps and heaters. The latter company is also building a 350 horse power steam engine for P. Lorillard & Co., New York. Their shops are full of orders.

New repair shops are to be established by the Erie Railway at Garfield station, on the Bergen short cut, to relieve the over-crowded shops at Jersey City. The plans are ready for the buildings, which will be commenced at once. They will be situated on a plot of two acres. About 100 men will be employed at first in the new shops.

S. W. Putnam has recently dissolved his connection with the Putnam Machine Company, Fitchburg, Mass. On the occasion of his retirement the workmen of the establishment presented him with a fine diamond pin worth $140 as a testimonial of their esteem. Hall, speeches, brass band, hand shaking, *et cetera*, constituted the "excercises," as reported at length in a local paper.

F. W. Richardson, Troy, N. Y., recently took orders for 30 sets of balanced slide valves from the Eastern, Fitchburg, Boston & Albany and Old Colony railroads. Several railroads, amongst them the Boston & Albany, have definitely adopted this valve and will apply it to all their locomotives. He informs us that, although considerably behind his orders, he is adding new tools to enable him to supply the demand.

The Pennsylvania Steel Company, Steelton, Pa., employ 2,200 hands with a monthly product of 11,000 tons steel rails, 1,000 tons steel billets, 250 tons switches and 600 to 800 frogs. They are building two Siemens melting furnaces, capacity twenty tons per heat, two blast furnaces 20-foot bosh, shop 80x400 feet for frog department, merchant mill with two trains of rolls.

The Billings & Spencer Co., Hartford, Conn., have made over 25,000 of Billings' Pocket Wrenches. The Pope Manufacturing Co., take 500 a month on a regular order. The orders for this wrench are generally two to four months ahead of the supply. Their orders for Billings' new ratchet drills are already ahead of the production. They have 24 drop hammers constantly at work, besides 7 tilt-hammers and 10 trimming presses. They have a standing order from the Home Sewing Machine Co. for 1,600 pieces a day (400 each of cams, shuttles, splines and feeds). They are making 40,000 sewing machine shuttles a month, of 30 different varieties. It takes 25 to 30 tons a month of iron and steel to supply material for the forgings from 1-16 of an ounce to 7 pounds each, made by this establishment. They have just put in a new Reutan boiler of 125 horse power, and a Berryman heater.

The new illustrated catalogue issued by Hill, Clarke & Co., 36 and 38 Oliver street, Boston, Mass., contains 152 pages. It bears evidence of an expenditure of much labor, time and taste in its arrangement, two years having been consumed in getting it up. The illustrations are very fine wood engravings, each of which is accompanied by a full description with dimensions, weights and speeds. Some of the engravings represent tools and machines that were never before published. The machines represented are for working iron, steel and other metals, besides wood-working machines for pattern makers. This catalogue, as a whole contains a choice collection of tools made by leading manufacturers in this country, whose products are sold by Hill, Clarke & Co. The steam engineering branch of this firm have sold steam engines during the past two weeks to the amount of 1,100 horse power, and are constantly engaged in fitting up factories and manufacturing establishments.

Machinists' Supplies and Iron.

NEW YORK, April 20, 1882.

There has been no material change in the condition of the supply market during the past week.

Pig Iron continues dull, with prices in favor of buyers We quote: Foundry, No. 1, at $25 to $25.50; Foundry, No. 2, $24 to $24.50; Gray Forge, $22 to $22.50.

Foreign Iron is coming in freely, which keeps prices in favor of buyers. We quote: Gartsherrie, at $25; Coltness, $25 to $25.50; Glengarnock, $24 to $24.50; Carnbroe, $23.50 to $24; Eglinton, $23 to $23.50. Steel and Iron Rails are more active. Copper is in slow demand, at 18¼c. for Lake Superior; Banca Tin, 29c.; Straits and Malacca, 23¼c to 23½c.; Billiton and Australian, 24¼c.; Lead, 5c.; Antimony, Hallett's, 12¼c. to 12⅝c.; Nevada, 13c. to 13¼c.; Cookson's, 14¾c.

WANTED

"Situation and Help" Advertisements, 30 cents a line, each insertion. About seven words make a line. Copy should be sent to reach us not later than Thursday morning for the ensuing week's issue.

Foreman Pattern Maker wanted. Apply to Watts, Campbell & Co., Newark, N. J

Wanted a situation as tool maker in a first class shop. Address "C," Box 13, AMERICAN MACHINIST.

A Mechanical Draughtsman desires re-engagement. Address "H," P. O. D. 38, New Haven, Conn.

Mechanical Draughtsman desires temporary employment Address, R P., Box 10, AMERICAN MACHINIST.

Wanted—A good green and dry sand and loam moulder Address Coxe Bros. & Co., Drifton, Jeddo, P O., Luzerne, Co, Pa.

Wanted—By a young man a position as foreman and draughtsman, now occupying a similar position Address Comadore, care AMERICAN MACHINIST.

The Ottawa Iron Works, Ferrysburg and Grand Haven, Michigan, want a few good machinists. Steady work and best wages. Reliable married men will find this a good opening.

Wanted—Practical Draughtsman, Machinist, or Foundryman with some capital and good references, to take interest in established paying business. Address L. M. Newbury, Sparta, Wis.

Wanted—Mechanical Draughtsman. One who is thoroughly posted on engine and pattern work. Address, giving references, etc. SMITH, MYERS & SCHNIER, 323 to 329 W. Front St., Cincinnati, Ohio.

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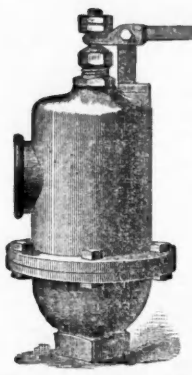

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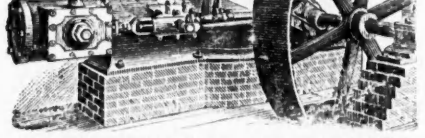

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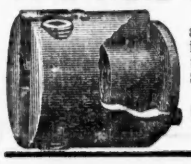

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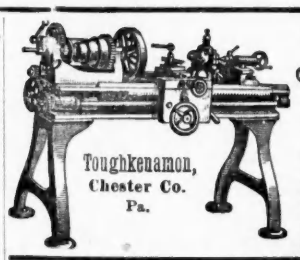

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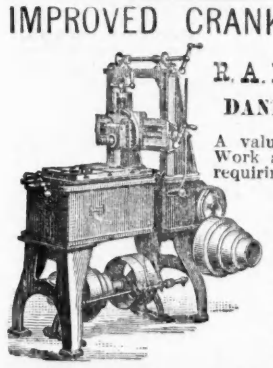

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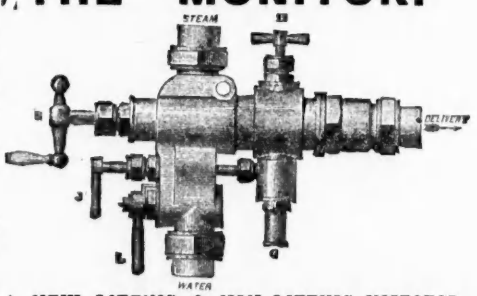

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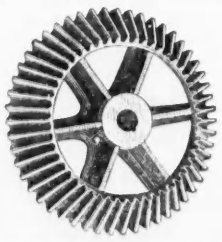

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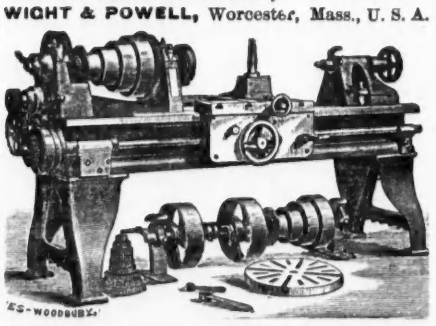

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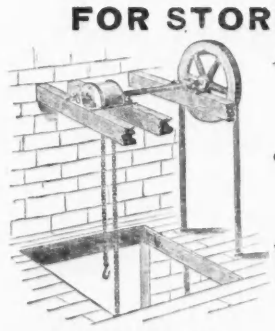

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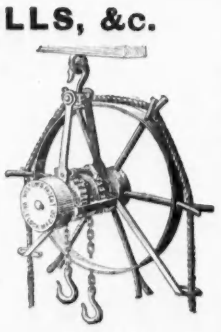

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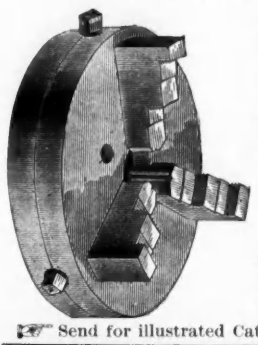

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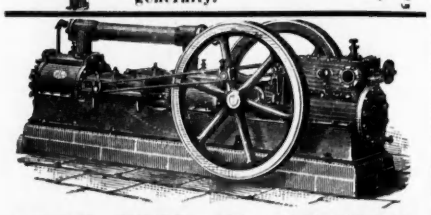

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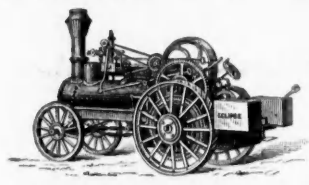

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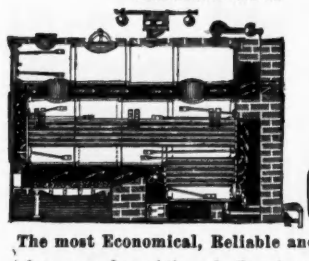

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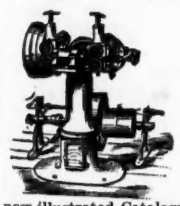

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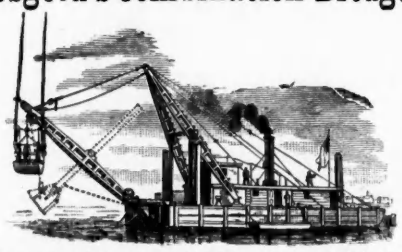

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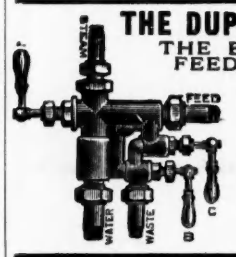

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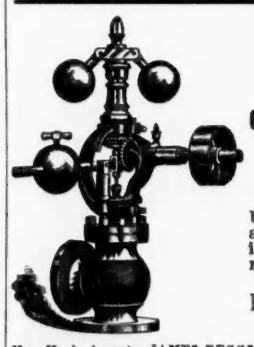

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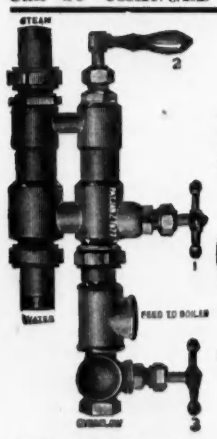

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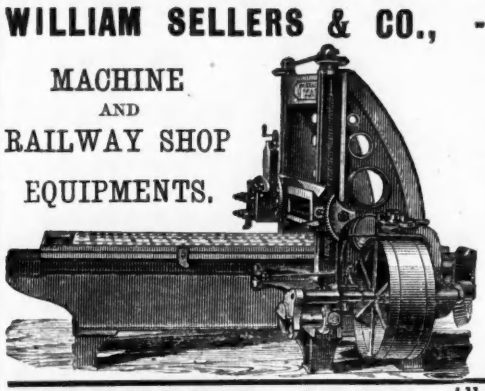

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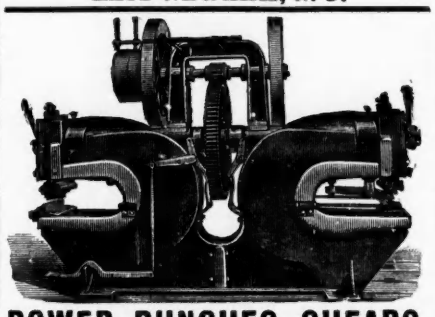

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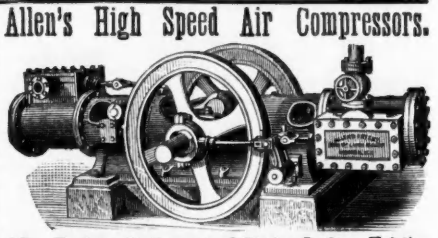

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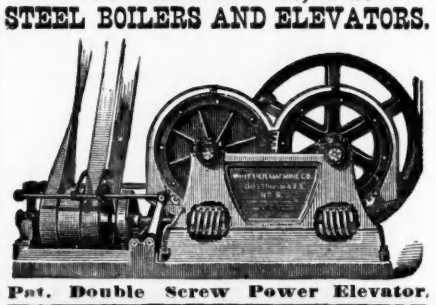

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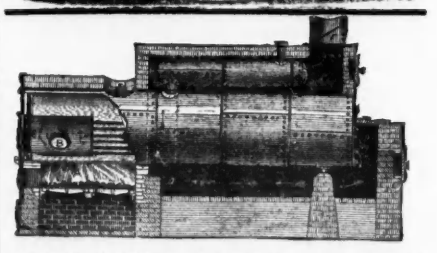

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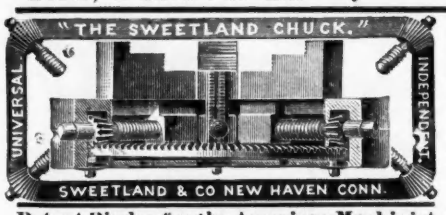

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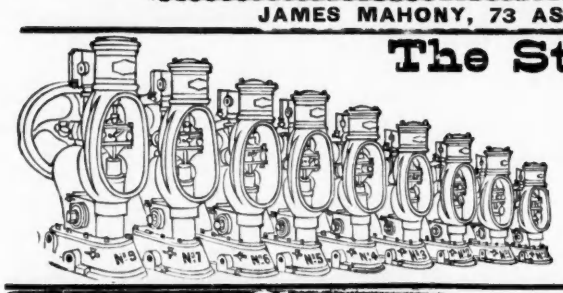

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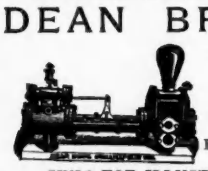

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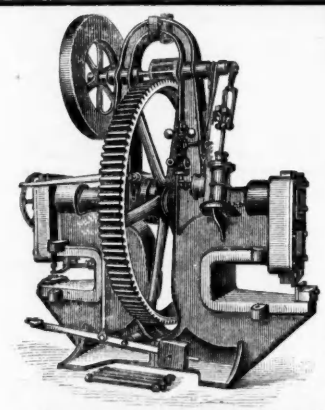

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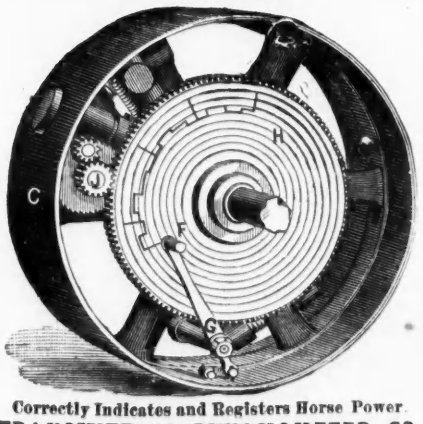

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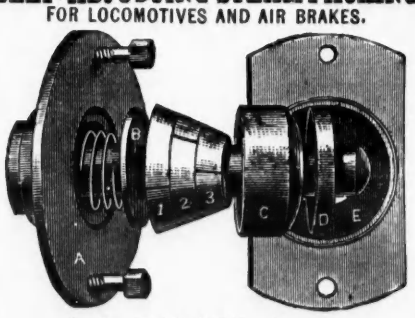

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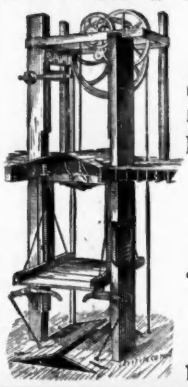

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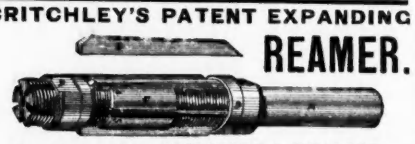

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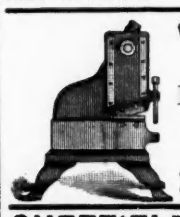

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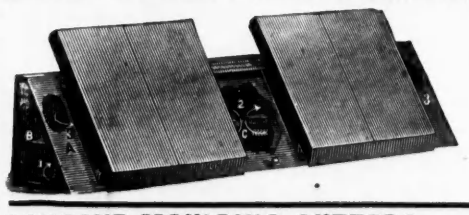

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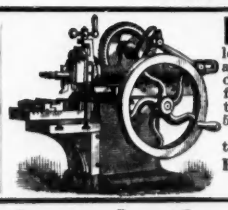

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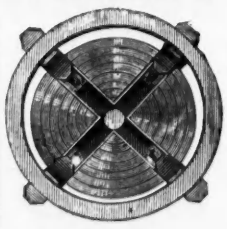

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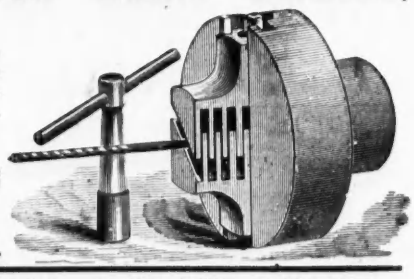

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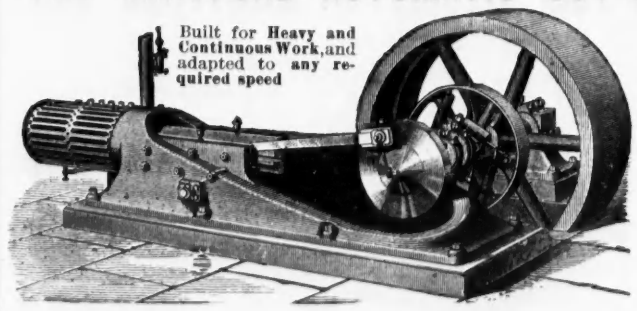

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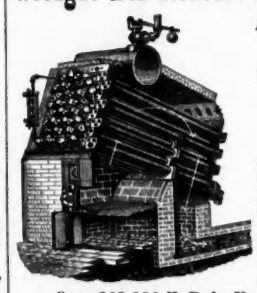

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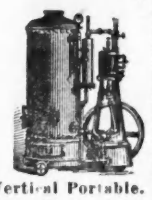

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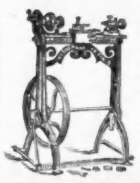

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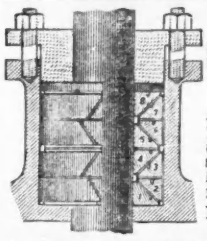

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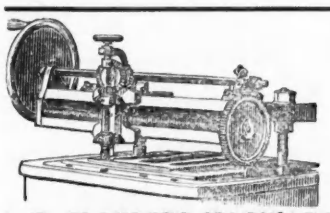

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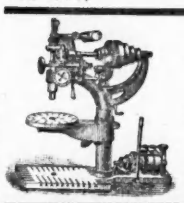

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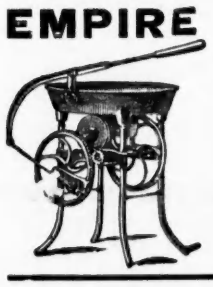

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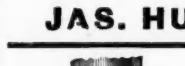

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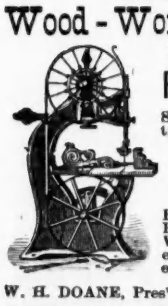

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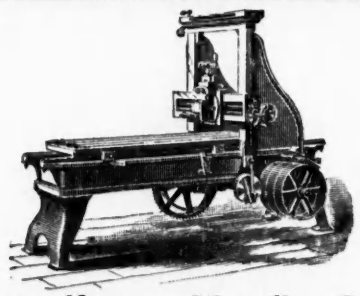

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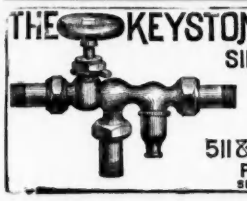

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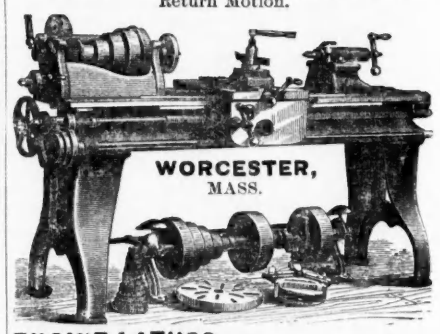

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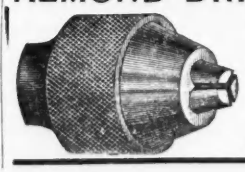

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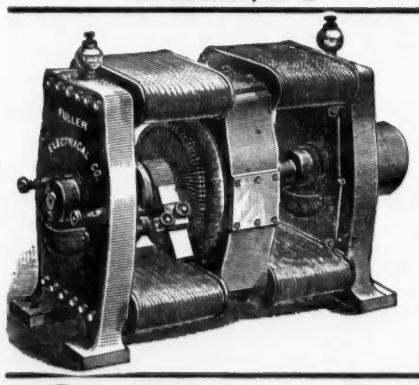

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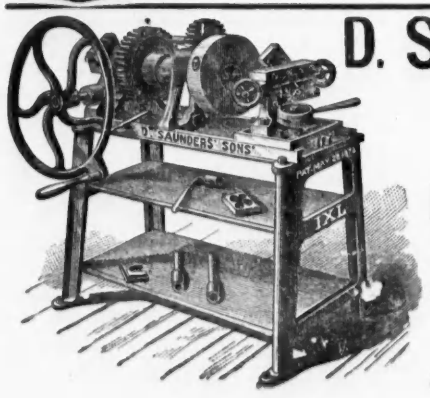

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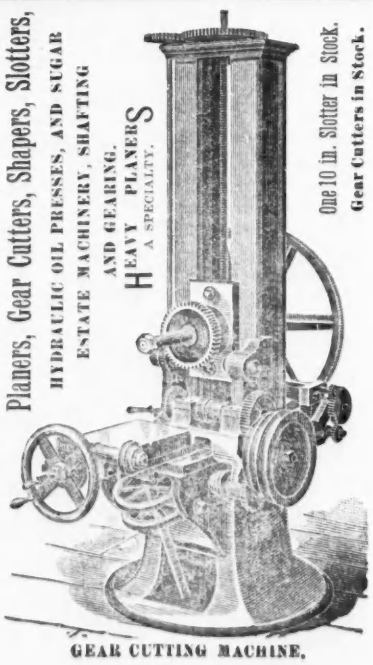

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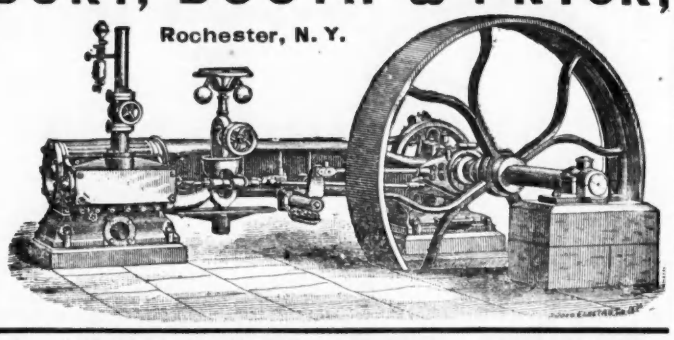

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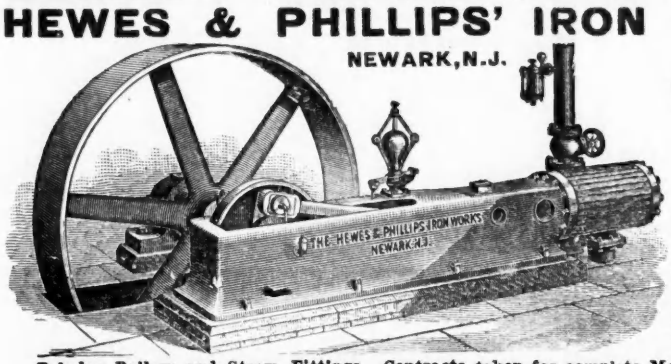

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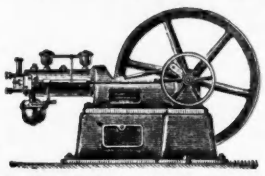

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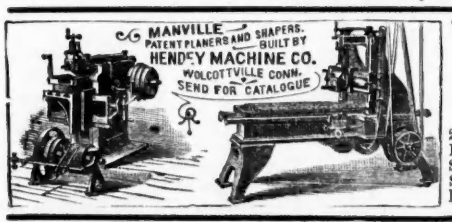

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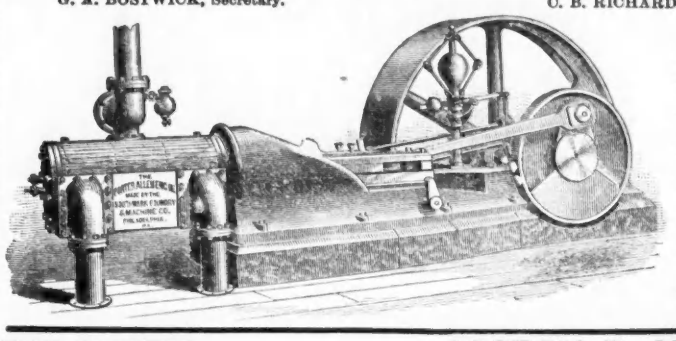

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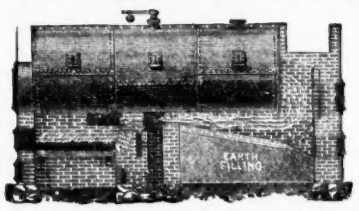

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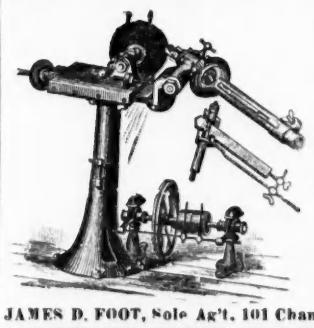

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26 in. x 26 in. x 6 ft. Gleason
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3 19 in. swing, 10 ft. Bed Engine Lathes. April.
4 11 in. " 5 ft. " " April.
2 30 in. " Upright Back Geared Drills. "
2 9 in. Shapers. New. April.
1 11 in. Shaper, 25 in. Traverse. April.

The following on hand:

1 30 in. swing, 15 ft. Bed Engine Lathe. New.
2 19 in. " 8 ft. " " "
2 18 in. " 8 ft. " " "
1 17 in. " 6 ft. " " 2d-hand.
1 1¾ in. " 4 ft. " " 2d-hand.
1 12 in. " 4 ft. " " New.
1 15 in. " 9 ft. Hand Lathe. New.
3 12 in. " 6 ft. " " "
1 10 in. " 4½ ft. Bed Hand Lathe. New.
1 Boring Lathe, 16 ft. bed. 54 in. swing.
1 Round Arbor Fox Lathe. Fine order.
1 26 in. x 5 ft. Iron Planer. 2d-hand.
1 20 in. x 4 ft. " "
2 48 in. Swing Radial Drills. New.
2 38 in. Swing Upright Drills. B. G. & S. F. New.
1 26 in. Drill. B G. & S. F. New.
1 18 in. Bench Drill.
1 2 Spindle Drill. New.
1 4 " "
2 Wall Drills, heavy. Second-hand. 60 and 72 in
1 15 in. Hendey Shaper. New.
1 9 in. Shaper. 2d-hand.
1 Index Miller.
2 Milling Machines, Lincoln pattern. Second-hand
1 Manhattan Arms Co. Miller. Second-hand
1 Sellers Milling Machine. 2d-hand.
1 Face Milling Machine. Second-hand.
1 Pond's Double Milling Machine. 2d-hand.
1 No. 2 Screw Machine. New. Turret Head.
1 Screw Head Slotter. Second-hand.
3 Second-hand Profiling Machines.
5 4½ in Hyde's Patent Centering Machines. New.
1 Emery Grinder, 2d-hand, for 10 in. Wheels.
1 Pipe Cutting Machine. Second Hand. 2 in.
1 1¾ in. Wood & Light Bolt Cutter. New.
1 Bolt Pointing Machine. Second-hand.
1 Double Nut Tapper. New.
1 Horizontal Boring Mill, 54 in. Swing.
1 Horizontal Boring Machine, 10 in. Swing. 2d-hand.
1 Betts, No. 2, Power Punch New.
4 Double Acting Presses, No. 3, nearly new.
4 Single-Acting Presses, for power, "
100 Foot Presses, nearly new.
1 Medium Power Punching Press. Second hand.
2 Small " " Presses. "
1 Foot Punch, with bench. New.
1 Lot Pistol Machinery. Second-hand.
3 Grind Stones and Frames.
1 Steam Hammer. Cylinder 6½x18. 2d-hand.
1 4 Side Moulding Machine. New. 8 in.
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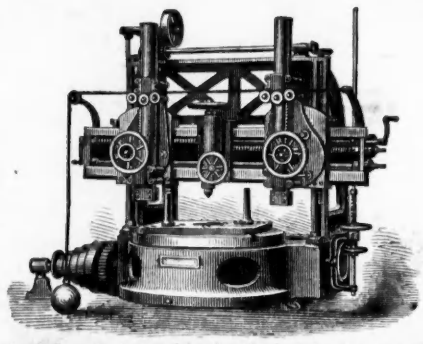

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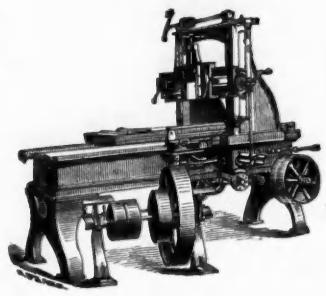

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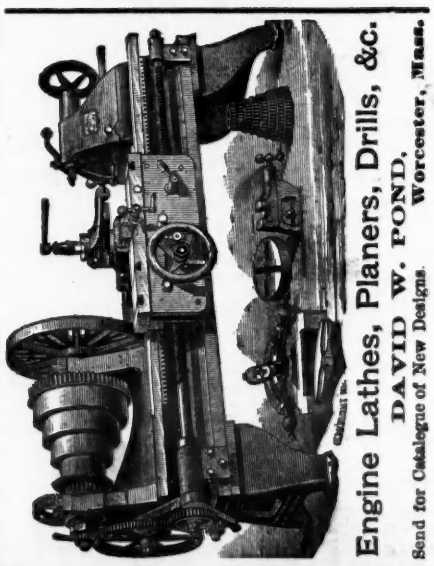

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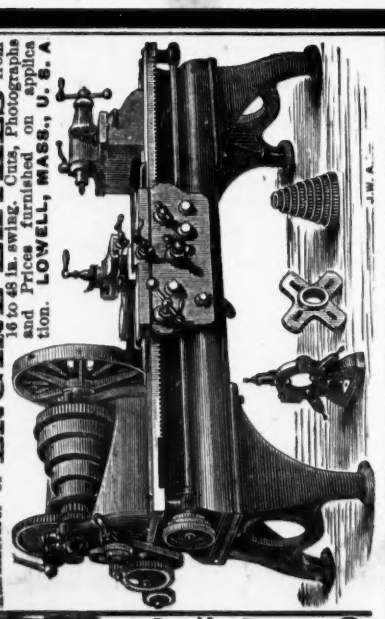

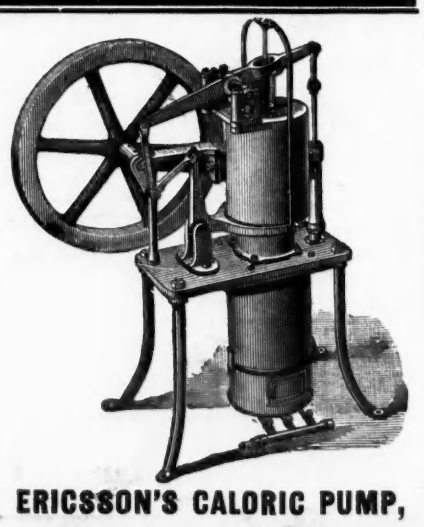

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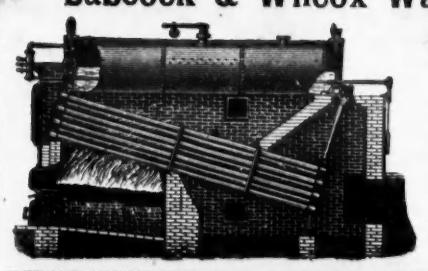

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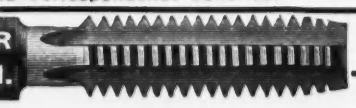

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